The Unesco Courier

APRIL 1984 — 6 French francs

Food for a hungry world

Photo Alain Gualina © ANA, Paris

22 | Nepal
The bathing of the carrots

The economy of Nepal is based essentially on the cultivation of food crops, and agricultural produce is the country's main source of export earnings. In the densely populated valley of Kathmandu with its warm temperate climate, the land is intensively farmed, even in winter. Apart from rice, maize, wheat, potatoes, beans, onions and other vegetables are grown. Above, farmers wash carrots in the river Baghmati near Kathmandu.

The Unesco Courier

A window open on the world

April 1984
37th year

Published in 27 languages

English	Tamil	Korean
French	Hebrew	Swahili
Spanish	Persian	Croato-Serb
Russian	Dutch	Macedonian
German	Portuguese	Serbo-Croat
Arabic	Turkish	Slovene
Japanese	Urdu	Chinese
Italian	Catalan	Bulgarian
Hindi	Malaysian	Greek

A selection in Braille is published quarterly in English, French, Spanish and Korean

Published monthly by **UNESCO**
The United Nations Educational, Scientific and Cultural Organization

Editorial, Sales and Distribution Offices:
Unesco, Place de Fontenoy, 75700 Paris

Subscription rates
1 year: 58 French francs
2 years (valid only in France): 100 French francs
Binder for a year's issues: 46 FF

Editor-in-chief:
Edouard Glissant

Cover: Photomontage Georges Servat
Photos UNICEF and Dominique Roger, Unesco

Editorial

'TODAY we must proclaim a bold objective—that within a decade no child will go to bed hungry, that no family will fear for its next day's bread, that no human being's future and capacities will be stunted by malnutrition..."

What has been achieved in the struggle against hunger in the ten years that have elapsed since these brave words were pronounced at the World Food Conference held in Rome in 1974?

The opening article of this issue of the **Unesco Courier**, *based on an independent assessment by an international group of experts, offers a mixed reply. Despite the addition to the global population of nearly one thousand million people, in global terms ample supplies of cereals are available today. Nevertheless, chronic hunger remains a problem for tens of millions of people.*

During the past decade, Asia, where most of the world's undernourished people live, has witnessed a remarkable increase in agricultural production. In Africa, on the other hand, food production has fallen even further behind population needs, particularly in the hunger belt that stretches across the sub-Saharan region.

For Antoine Dakouré, the key to redressing this situation lies in a more dynamic approach to development aid, a stiffening of political resolve to implement agrarian reform, and a determined effort to gain the wholehearted involvement of agricultural workers without which no real change can occur. This, however, depends upon political guidelines which only the developing countries themselves can decide.

The head of the Worldwatch Institute, Lester Brown, draws attention to two major problems: the risks involved in the world's overwhelming dependence on one region (North America) as a buffer to meet national shortfalls in grain production and the alarming annual loss of some 23,000 million tons of topsoil through erosion, coupled with diminishing returns from additional use of chemical fertilizers.

The first victims of undernourishment and malnutrition are the children of the Third World, yet, as V. Ramalingaswami points out, many of the diseases that afflict them, such as endemic goitre, nutritional blindness and anaemia, could be very simply and inexpensively controlled. In many cases, the problem is one of sheer ignorance of the basic facts of good nutritional practice. In this domain, Unesco's nutrition education programmes are beginning to make their impact felt.

Ironically, the vast majority of the world's undernourished people are to be found among the rural poor and are engaged in the production of food. As Paul Lunven of the Food and Agriculture Organization of the United Nations suggests, some rural development projects may have been placing too much emphasis on investment in cash crops, to the detriment of the food crops on which rural families depend for their food supply.

On a more optimistic note, Yuri Ovchinnikov outlines some of the more promising achievements in the biological sciences. Recent scientific advances are making possible higher crop yields and new and far more productive strains of livestock.

Finally, two broader observations emerge from this assessment of the world food situation. The first is that the countries of the world are now so interdependent that only through international action can poverty and hunger be defeated. The second is that so long as one man, woman or child goes hungry, the scandalous waste of resources on armaments brings added shame upon us all.

page

4 **Where do we stand in the war on hunger?**
An independent assessment

5 **Food for a hungry world** *by K. Antoine Dakouré*

9 **Ill fares the land...**
Have we reached the end of a growth era in world food output?
by Lester Brown

12 **Children in peril** *by V. Ramalingaswami*

14 **Malnutrition's tragic toll**

16 **Food first**
A down-to-earth approach to nutrition and rural development
by Paul Lunven

20 **Africa: the hunger belt**

22 **Seeds of plenty**
The promise of biotechnology *by Yuri Ovchinnikov*

25 **Interdependence**
'Nationalism provides too narrow a focus for overcoming poverty and hunger' *by Paul Steidl-Meier*

29 **Unesco and nutrition education** *by Susan Van Der Vynckt*

32 **War, hunger, poverty** *by Luis Echeverria*

2 **A time to live...**
NEPAL: The bathing of the carrots

ISSN 0041 - 5278
No 4 - 1984 - OPI - 84.1 - 409 A

Where do we stand in the war on hunger?

THE United Nations World Food Conference, held in Rome in 1974, represented a bench-mark in thinking about the global food system. The immediate threats of famine in the Indian sub-continent and the African Sahel, coupled with the drawdown of world reserves to their lowest levels in twenty-five years and corresponding increases in food prices, shocked the international community into a mood of serious concern and reappraisal.

The first and overriding assumption in the minds of many delegates in 1974 was that the world was entering a period of tight food supplies brought about by population growth, without a cushion of large reserves, and that mass starvation was a distinct possibility. Demand was in danger of outpacing available supplies in the developing regions, especially in Asia. At the same time, demand for grain and meat was expanding in higher-income developing countries.

In these circumstances, the major food-producing countries would not be able to produce enough grain to meet the demand; nor did it appear likely that such large projected import requirements could even be transported, assuming foreign exchange to pay for them. Moreover, since the balance of supply and demand would at least be close, with little surplus, recurrent food crises were more likely, given climatic variability and man-made disruption. Therefore, new international mechanisms were needed to ensure adequate food supplies.

The answer proposed to the world food problem was essentially increased agricultural production in the food-deficit developing regions. Increased production would mean greater food self-reliance and less dependence on trade. There was reasonable confidence about the technical means to increase production in the food-deficit regions, if sufficient priority and resources to agriculture could be allocated and maintained.

Hence there was an implicit optimism at the World Food Conference, at least in the rhetoric, that with increased production in food-deficit areas the worst aspects of hunger could be eradicated in a decade and the threat of starvation could be virtually eliminated.

Great emphasis was placed on mobilizing the political will necessary to keep food issues in the forefront. To maintain political momentum, special follow-up and oversight bodies were created, including the World Food Council, the FAO Committee on World Food Security, and the Committee on Food Aid Policies and Programmes. There was also the feeling that international agreements were needed in order to establish a system of nationally-held food reserve capabilities and to ensure adequate food aid levels in times of emergencies and local production shortfalls.

The fear of another period of rising prices prompted a concern for expanding agricultural production to promote food self-sufficiency ("zero imports") and for negotiating international reserves and food aid agreements that could protect low-income countries from natural or man-made disasters, high prices, or political vulnerability due to dependence on large food imports. Hence, food security was implicitly identified with commercial food prices and physical availability and less with demand and consumption issues regarding poor people or nutritionally vulnerable groups.

By 1984 many of the assumptions emanating from the 1974 Conference have proved to be ill-founded, or have developed in circumstances different from those originally anticipated. No doubt, the major assumption that has not been borne out was that the world was entering a period of tight food supplies globally, and hence rising prices.

After a slow start in 1975, the years 1976, 1977 and 1978 witnessed a substantial recovery in cereal production and in the levels of reserves held by the major grain producers. Total world production fell below aggregate consumption in 1979 and 1980, with a resulting drawdown in reserves; but bumper world production levels in 1981 and 1982 brought in record surpluses and the lowest real market prices for cereals in 30 years.

Despite such variability in grain crop production performance, market adjustments were made fairly smoothly after 1974, even without an effective International Wheat Agreement in place. Demand for grain-fed livestock grew rapidly in the Soviet Union, Eastern Europe, and some middle-income developing countries. During the decade, trade in coarse grains increased fourfold, yet supplies proved more than ample to handle this demand.

In the decade after the World Food Conference, the net addition to global population has been approaching one billion people. Much of this increase has taken place in those countries or regions known for acute food problems, but this has not led to any strain on the world food situation. On the contrary, by 1984 the world cereal situation was similar to that of the early 1970s—ample supplies at the global level, depressed grain prices, and unmarketable production in North America and the European Community.

While the threat of rising international food prices has not been borne out during the decade, international agricultural trade has been marked by the disruptive influence of international market instability.

The decade has also witnessed a clearer understanding of the nature and extent of malnutrition. The "hunger problem" is no longer perceived to be one of starvation or protein deficiency, but rather of chronic undernutrition, affecting a range of vulnerable groups whose common bond is their poverty. As called for in 1974, the potential for mass famine has been largely eliminated—given the willingness of a stricken country to accept assistance. The international response process has made notable improvements. Relief supplies, both domestic and international, have been mobilized for the large majority of emergency situations during the decade, most of which were local in character and the result of man-made disasters and ensuing refugee movements.

Despite these improvements, chronic hunger is still a staggering problem for tens of millions of people. Reaching them—as opposed to disaster or famine victims—has proved to be a much more intractable task than many imagined in 1974.

It is now realized that the hungry are closely linked to their particular food- and labour-market conditions and to the impact of changing technologies on their societies. Ironically, the undernourished are often engaged in the production of food.

Overall, the focus of international concern about food and hunger problems has slowly shifted from Asia to Africa. Asia, as a whole, has made rapid strides in increasing agricultural production; and dependency on imported cereals has been reduced, although Asia still has the largest absolute number of poor and chronically undernourished. Africa, on the other hand, seems to be living out the 1974 fears. Food production has fallen well behind population needs, and external food supply has become increasingly essential. The undernourished in Africa are now a much higher percentage of total population in that region than they are in Asia.

Finally it is recognized that overcoming hunger is ultimately linked to viable employment opportunities and income generation, whether in the countryside or in urban areas. ■

Photo Dominique Roger, Unesco

This text has been taken from The World Food and Hunger Problem: Changing Perspectives and Possibilities 1974-1984, *an independent assessment, presented to the World Food Council, on progress in meeting food objectives since the 1974 World Food Conference. By Walter P. Falcon (USA), C.T. Kurien (India), Fernando Monckeberg (Chile), Achola P. Okeyo (Kenya), S.O. Olayide (Nigeria), Ferenc Rabar (Hungary), Wouter Tims (The Netherlands)*

4

Food for a hungry **world**

by K. Antoine Dakouré

FOR years, the vast problem of hunger in the world has been the focus of lengthy debate in various organizations at the governmental, non-governmental and international levels. A world conference organized by the Food and Agriculture Organization of the United Nations (FAO), held in 1974, exposed the global scale of this drama and provided an opportunity to identify its causes, to analyse them in depth and to single out those measures which, it was widely agreed, could lead to the eradication of hunger within a decade.

In a noteworthy study entitled *Agriculture: Toward 2000,* published three years ago, the FAO warned all nations of the deteriorating situation and offered concrete suggestions for controlling hunger effectively. Today, however, it must be admitted that the plight of the world's underprivileged is steadily worsening. Nearly 500 million human beings, stagnating in poverty, are under daily threat of famine. The population of the most vulnerable countries increases by 2.5 per cent a year, whereas the annual increase in cereal production has levelled out at 1 per cent. If current trends continue, requirements for cereal aid, which totalled 7.6 million tonnes in 1979, will reach some 21 million tonnes by 1990.

Land resources are very seriously depleted in many regions. Demographic pressure, which is responsible for the increasing over-exploitation of arable land, the destruction of plant cover and the damaging effects of extensive grazing, is the ultimate cause of accelerated desertification, whose consequences in the medium term are just as harmful as a nuclear holocaust. Our planet is threatened by famine and yet, at the same time, we continue to exhaust almost twenty million hectares of land every year.

Why does the problem seem insoluble despite all indications that it has been carefully and perspicaciously analysed? There are undoubtedly many reasons, the most serious of which, it would seem, is that both the developing and the industrialized nations lack the political courage needed to implement the measures recommended. ▶

K. ANTOINE DAKOURÉ, *of Upper Volta, has held a number of senior posts in his country's government, including those of Minister of Agriculture, Minister of Planning and Rural Development and Adviser to the President of the Republic. President of the Governing Council of the United Nations Development Programme (UNDP) in 1973 and Upper Volta's ambassador to the European Economic Community from 1981 to 1983, he was also a member of the independent Brandt Commission.*

"Even the best rural development projects designed by experts and backed with all the material, technical and financial resources needed, are destined to fail if the farmers in whose interest they are purported to be carried out do not feel sufficiently concerned to offer their unreserved participation and if they lack the assurance that the projects are for their own benefit".
Below, Egyptian workers set to with a will.

Photo H.W. Silvester © Rapho, Paris

Photo J. Van Acker, FAO, Rome

◀ *Red sorghum, used in making a local beer called "dolo", on sale at a market in Upper Volta. The FAO's fertilizer programme is helping subsistence farmers in Upper Volta and other developing countries to increase crop yields by as much as 50 per cent.*

Bags of maize from Zimbabwe being loaded into a Greek freighter chartered by the World Food Programme (WFP) at the port of Beira, Mozambique, for onward transmission to Chad and Cape Verde. This forms part of a WFP operation in which cash from donor countries is used to buy food from an exporting developing country for use as food aid in other developing countries. ▶

Photo F. Mattioli, FAO, Rome

▶ Citizens of the industrialized nations only become aware of hunger, of the tragedy afflicting hundreds of millions of human beings every day, when it reaches catastrophic proportions, as in the Sahel. Emergency aid is mustered amid sweeping gestures of human solidarity in response to these cries of distress. Interest slackens once steps have been taken and aid donors can again sleep with a clear conscience. There is general approval of the praiseworthy efforts and perseverance of the non-governmental organizations, but what do these amount to compared with the enormous potential still lying dormant?

Governments and political parties should do more to promote a more dynamic image of development aid, too often seen as a simple act of charity. Too few people seem to understand that helping their neighbours progress to the point where they can participate in mutually beneficial exchanges is certainly one of the most effective ways of safeguarding their own future. Helping to increase the purchasing power of the less fortunate countries would stimulate production and ease the strains of immigration.

Unfortunately, such an evolution of the "weaker partner" will remain virtually impossible as long as international economic relations are subject to the existing system which was designed by the strong to satisfy their own needs. The complex of subservience it induces among the less strong results inexorably in tensions that threaten world peace. A starving and impoverished man is easily driven to extremes precisely because he has nothing to lose. As the popular Turkish saying so aptly puts it: "If you starve a lamb, he will become a wolf."

If no decisive steps are taken to reverse current trends whereby the poor grow daily poorer, social and political tensions, caused by economic difficulties, exaggerated further by poverty, will certainly have harmful repercussions on North-South relations.

It is the duty of all mankind to fight to control poverty and limit its consequences, for humanitarian reasons, of course, but also, and above all, to achieve a state of peace which all living creatures require if they are to thrive.

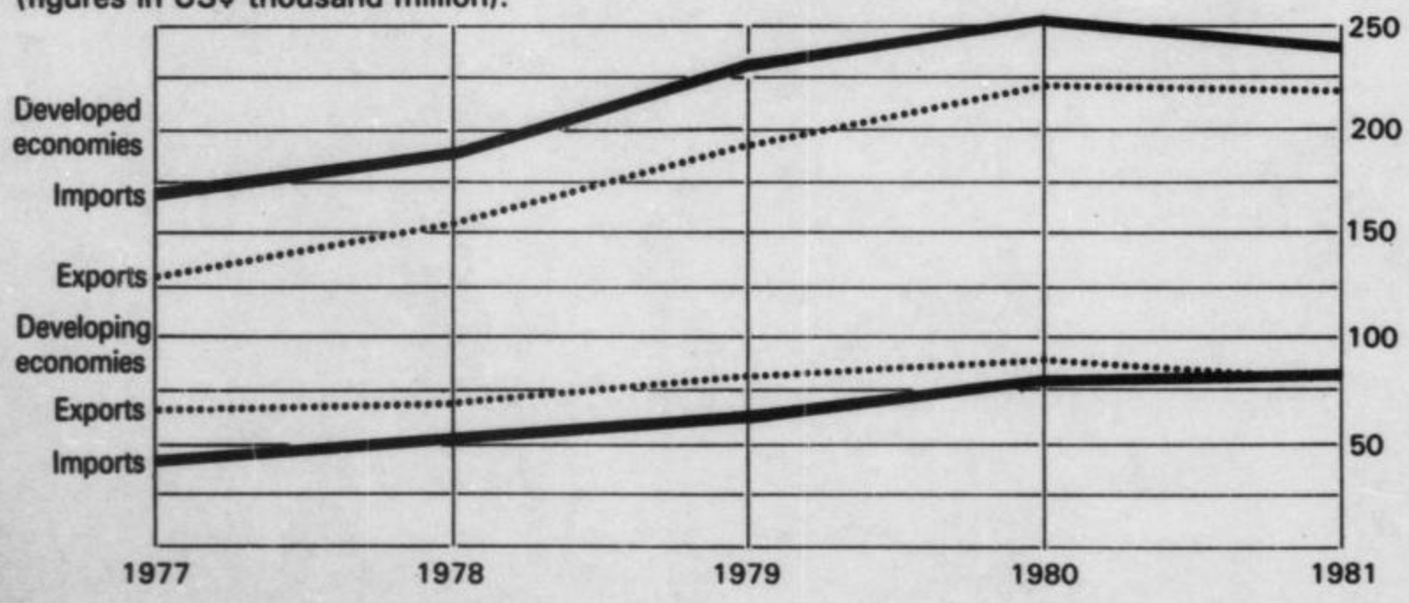
The notion that the eradication of hunger in the world is an international responsibility is not new. Considerable efforts already under way prove that this notion of responsibility is receiving increasing acceptance; yet there is no doubt that the scourge of hunger is still rife, particularly in the rural areas of Africa, Latin America and the Near and Far East.

What is to be done? Given the extreme complexity and diversity of the peoples concerned, it is impossible to find a single solution suited to all countries. However, as the rural sector is usually the most vulnerable it is on this sector that we shall concentrate our attention.

National development plans have almost always granted the highest priority to the rural sector, with special emphasis on self-sufficiency in food. Leaders quickly become aware of the vanity of their nations' desire to achieve independence and undertake development efforts while their underdeveloped rural sectors are incapable of satisfying basic needs and supporting expansion in other sectors of the national economy. Despite this realization, government policies have continued to underestimate the importance of the measures required.

It is unrealistic to attempt to increase food production without first considering all the steps needed to motivate and encourage the main protagonists of agricultural development. These steps depend upon political guidelines which only the countries concerned can determine. At this stage the developing nations' major share of the responsibility can be gauged. Without seeking to excuse either the Western or Eastern industrialized nations who rely on their might to influence the

Imports and exports of agricultural products, total developing and total developed economies, 1977-1981
(figures in US$ thousand million).



World trade in agricultural products is dominated by the developed countries. Nevertheless, those developing countries that lack oil resources are heavily dependent on agricultural commodities for their export earnings. On average, four out of every ten dollars earned from exports by these countries come from sales of agricultural, forest and fish products. Unfortunately, export prices for many of these commodities have declined in real value while the cost and volume of imports from the developed world have risen. In 1981, the value of imports by the developing countries as a whole exceeded that of exports.

Source : FAO, Rome

decisions of the weaker nations, I do not accept outside intervention as an explanation of all our shortcomings in the area of agricultural development.

The allocation of resources employed to execute development plans, which we ourselves decide, only rarely reflects the priorities defined in these plans. Furthermore, we vigorously condemn arms expenditures which swallow up some five hundred thousand million dollars every year, or ten times more than the amount needed to ensure that no human life be lost for lack of nourishment, yet our contribution accounts for 20 per cent of this sum. Many other examples could be cited, but this is not the main point at issue.

We must learn from experience and systematically avoid repeating our past errors in order to build a better future. Self-sufficiency in food is clearly the top priority goal. Each country is drafting its strategies according to specific social, economic, cultural and political criteria. Secondary goals and steps to be taken are also being determined. Whilst the funds required generally fall short of needs, the paucity of material or financial resources is a doubtful pretext for mediocre results, as we shall see below. I shall use the following example to highlight an observation I feel to be of paramount importance before proposing not a panacea, but rather a few factors that might be considered in the quest for solutions.

At the beginning of the 1960s, a group of experts on a field assignment drafted and carried out a soil recovery project in the Sahelian region of Upper Volta. Accurate measurements and calculations showed that the erosion caused by a torrential rainstorm lasting about twenty minutes amounted to some 14 tonnes of fine topsoil per hectare. This calculation gave eloquent proof of the interest of the project, for which farmers were recruited to help dig small dikes along contour lines to control rainfall. To the experts the value of this laudable project was evident. Unfortunately, however, the promoters failed to ensure that the farmers also understood the advantages it offered them. Because they were neither consulted nor paid to maintain the dikes, the farmers soon lost all interest in the "white man's ditches". It was only some years later, when those dikes that had not collapsed controlled the rainwater flow, bringing more water to the wells and improving neighbouring fields, that some of the farmers began to understand the value of the project. Those farmers who recognized the benefits to be obtained requested no financing whatsoever to repair or rebuild their dikes.

This experience and many others observed in the field provide proof that even the best rural development projects, designed by experts and backed with all the material, technical and financial resources needed, are destined to fail if the farmers in whose interest they are purported to be carried out do not feel sufficiently concerned to offer their unreserved participation and if they lack the assurance that the projects are for their own benefit.

It is important, therefore, to seek methods of approach that involve farmers as much as possible rather than insisting on taking decisions for them and imposing solutions on them without taking the precaution of soliciting their opinion. This is an essential prerequisite to obtaining their collaboration. Without the farmers' wholehearted involvement no profound changes can take place. Their participation cannot be obtained by presidential decree or ministerial decision. Tangible, co-ordinated measures are required which will progressively create a favourable environment, working at a pace acceptable to the farmers and not racing ahead at the speed of technicians and politicians. The farmer must be assured that the land he needs as well as seeds, equipment and other inputs, of adequate quality, will be made available to him at the right time and in sufficient quantity. Furthermore, he must have some guarantee that, when production begins, he will not be despoiled of the fruits of his labour.

Such guarantees, which would certainly help motivate farmers, imply the following pre-conditions:

- well prepared and carefully executed agrarian reform to ensure equitable distribution of farm land;
- the restructuring of research methods at the national and regional levels in order to adapt them to local conditions. The concept of technology transfer must be seriously revised because the methods currently used to increase agricultural production, developed in the North, rarely generate similar results in the developing countries. Agronomic research can only respond adequately to farmers' expectations to the ex- ▶

▶ tent that it can be adapted to help solve particular local problems. Moreover, since research entails investment beyond the possibilities of individual countries, it can only be truly effective as part of regional co-operation schemes;

• the granting of tax relief to reduce initial costs as well as the cost of production factors;

• the institution of an agricultural credit scheme flexible enough to respond to farmers' needs and possibly even help them meet some of their social obligations. These obligations, generally ignored by official banking organizations, force farmers to accept loans from speculators at exorbitant rates of interest;

• the introduction of measures to discourage imports, for example, by raising the price of imported food products;

• a more rational organization of the collection, distribution and marketing of produce which would guarantee farmers more attractive profits.

Naturally, the social aspects of development, education, hygiene, health, culture, balanced nutrition, the rational use of water resources and nature conservation must be given special attention. Of course, it is most important to fight hunger by increasing agricultural production, but all these factors have an undeniable impact on trends in the rural sector for reasons so obvious that it is unnecessary to enumerate them here.

As stressed in the study *Agriculture: Toward 2000,* it should be possible to solve the problem of hunger in the world by the year 2000. Generally speaking, however, while considerable emphasis has been placed on all the sectoral areas that influence programme success, I feel that the vital question has yet to be answered: "What concrete measures can be taken to create the motivation essential to progress in the field of agricultural production?" Unesco and the FAO could undertake joint initiatives in order to make a detailed examination of this question with the appropriate organizations in the countries concerned. If the answer to this question could be found, we should be able to solve the problem of hunger despite the modest funding available.

As a first step, food aid, which enables us to attend to the most urgent cases rapidly, is a highly positive factor. It can help stabilize food prices and encourage efforts to increase the quantity and improve the quality of agricultural production. However, it must be restricted to these goals alone and be used only to meet clearly defined needs.

Beneficiaries and donors of food aid must ensure that it does not become self-perpetuating. A prolonged commitment would constitute a long-term hindrance to the development of local agricultural production.

This reservation aside, nobody can deny that well organized food aid is precious. It could, however, become a formidable weapon and a serious threat to peace if the donor countries were to succumb to the temptation to use it as a lever in international relations.

■ **K. Antoine Dakouré**

Growing population pressure on limited resources is one of the main causes of emigration from the Andean highlands of Latin America. For the first time in history the downslope areas below the altiplanos are being massively exploited and lack of sound agricultural practice is leading to accelerated soil erosion. Above, a young shepherd girl in the Peruvian altiplano with one of her flock of alpacas. A member of the llama family, the alpaca is bred for its valuable wool. Photo © IDRC, Ottawa

Over-exploitation of resources is not confined to the land. Recently, this fisherman (below) from the island of Buad, near Samar, in the Philippine archipelago, like many of his fellow inshore fishermen, found his livelihood threatened by the inroads of large foreign trawlers. These trawlers have now been banned from fishing within six nautical miles of the coast, but, as the world becomes more and more reliant on fish as a supplement to land crops, local, national and international regulation of fishing rights takes on increasing importance.

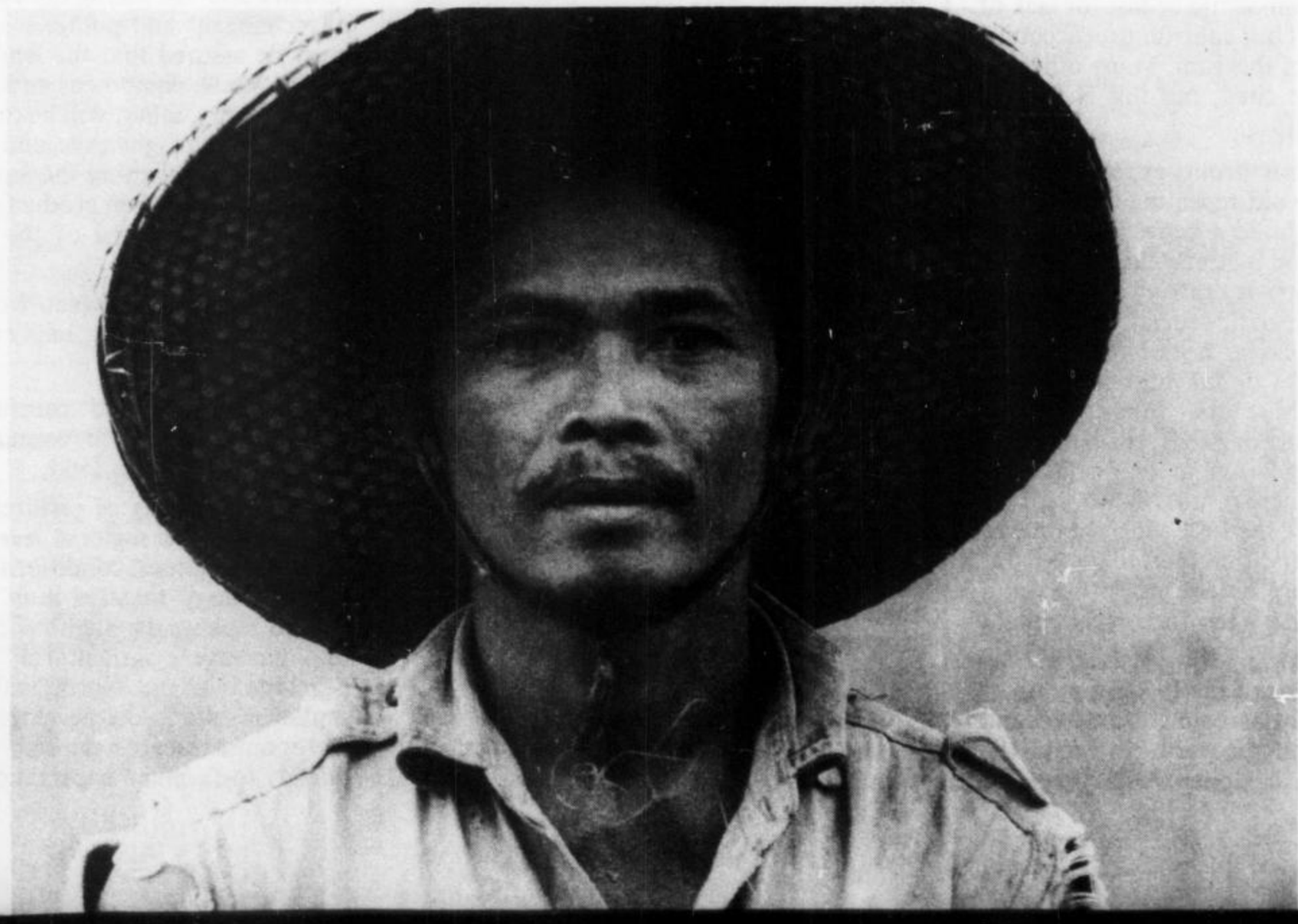


Photo © CCFD, Paris

Photo F. Botts, FAO, Rome

Ill fares the land...

Have we reached the end of a growth era in world food output?

by Lester R. Brown

AS the world recovered from World War II, hopes for improvement in world agriculture were high. An accumulating backlog of agricultural technologies such as hybrid corn and chemical fertilizers were waiting to be applied on a massive scale. Between 1950 and 1973 world grain production more than doubled, to nearly 1.3 billion tons. Although output expanded more rapidly in some regions than in others, all regions shared in the growth. This rising tide of food production improved nutrition throughout the world, helping to boost life expectancy in the Third World from less than forty-three years in the early 1950s to over fifty-three years in the early 1970s.

This period of broad-based gains in nutritional improvement came to an end in 1973. After the oil price hike that year the growth in world grain output slowed. Since 1973 world grain production has expanded at less than 2 per cent yearly, barely keeping pace with population. Although the period since the 1979 oil price hike is too short to establish a trend, $30-a-barrel oil may well slow growth further.

In *per capita* terms world grain output climbed from 248 kilograms in 1950 to 326 kilograms in 1973, an impressive gain of 31 per cent. Since then, however, annual grain output per person has remained around 325 kilograms. A global average, this figure embraces countries where yearly grain availability per person averages only 150 kilograms, requiring that it all be consumed directly, as well as countries where it exceeds 700 kilograms and is largely converted into meat, milk, and eggs.

Since 1973 attention has focused on the impact of petroleum prices on food supply, but demand has also been affected. On the supply side, rising oil prices have increased the costs of basic agricultural inputs—fertilizer, pesticides, and fuel for tillage and irrigation—thus acting as a drag on output. On the demand side of the equation, escalating oil prices combined with ill-conceived national economic policies have contributed to a global economic slowdown so severe since 1979 that it has brought world growth in *per capita* income to a virtual halt.

Had incomes continued to rise at the same rate after 1973 as they did before, prices of food commodities would have been stronger, thus supporting a more vigorous growth in farm investment and output. Agricultural under-investment in Third World countries has also contributed to the loss of momentum, but the central point is that the rise in oil prices, affecting both food supply and demand, has brought the era of robust growth in world food output to an end.

Oil is not the only resource whose questionable supply is checking the growth in food output. The loss of topsoil through erosion is now acting as a drag on efforts to produce more food, And the scarcity of water is also beginning to affect food production prospects. Since World War II, the world irrigated area has more than doubled, but the flurry of dam building of the past generation has now subsided. With occasional exceptions, most of the remaining potential projects are more difficult, costly, and capital-intensive. ▶

LESTER R. BROWN, *of the USA, is President of Worldwatch Institute, Washington, D.C., a non-profit research organization which was created to focus attention on global problems and is funded by private foundations and United Nations organizations. The present article has been extracted from "Securing Food Supplies", a chapter from* State of the World 1984, *a Worldwatch Institute report on progress toward a sustainable society. The report, of which Lester Brown was project director, monitors changes in the global resource base (land, water, energy and biological support systems). It is published by W.W. Norton and Co., New York and London.*

As the demand for food has climbed each year, the farmers of the world have begun to "mine" its soils, converting them into a non-renewable resource. It has been estimated that erosion on cropland exceeds new soil formation by 23,000 million tons per year and that topsoil reserves will disappear in about 150 years if steps are not taken to protect them. Below, cactus being grown as an anti-erosion measure near the Ousseltia experimental and demonstration centre, Tunis.

The worldwide loss of momentum will not be easily restored. Although agricultural mismanagement abounds, it has not worsened appreciably over the years. Nor can the situation be explained by any farmer's loss of skills. The explanation lies in the more difficult circumstances facing farmers everywhere.

The cheap energy that permitted farmers to override easily the constraints imposed by the scarcity of land, soil nutrients, or water is simply no longer available.

Increasingly, the energy used in agriculture will be in the form of chemical fertilizer. As population grows, cropland per person shrinks and fertilizer requirements climb. And erosion that has robbed soils of nutrients is forcing farmers to use more fertilizers. Even urbanization is raising demand, since as people move to cities it is harder to recycle the nutrients in human and household waste. Yet the combination of rising energy costs and diminishing returns on the use of additional fertilizer raises doubts that adequate food supplies can be produced in the future at prices the world's poor can afford.

The central importance of the population/land/fertilizer relationship is a recent phenomenon. Before 1950 increases in food output came largely from expanding the cultivated area, but with the scarcity of fertile new land and the advent of cheap chemical fertilizer this changed. Between 1950 and 1983 world fertilizer use climbed from 15 million to 114 million tons, nearly an eightfold increase within a generation. In effect, as fertile land became harder to find, farmers learned to substitute energy in the form of chemical fertilizer for land. Fertilizer factories replaced new land as the principal source of growth in food production.

This substitution of energy for land is graphically evident: In 1950, when world population totaled 2.51 billion, the harvested area of cereals per person was 0.24 hectares. As growth in population greatly outstripped that of cultivated area, the area per person fell steadily, declining to 0.15 hectares by 1983. While the amount of cropland per person declined by one third, the fertilizer consumption per person quintupled, climbing from just over 5 kilograms in 1950 to 25 kilograms in 1983.

The hybridization of corn and the dwarfing of the wheat and rice varieties that have been at the heart of Third World agricultural advances over the last two decades figured prominently, of course, in the growth in world food output. So, too, did the doubling of irrigated area. But the effectiveness of all these practices depends heavily on the use of chemical fertilizer. Without an adequate supply of plant nutrients, high-yielding cereal varieties hold little advantage over traditional ones. Likewise, an increase in irrigation is of little consequence if the nutrients to support the higher yields are lacking.

The response of crops to the use of additional fertilizer is now diminishing, particularly in agriculturally advanced countries. During the 1950s, the application of another ton of fertilizer on average yielded 11.5 more tons of grain. During the sixties, the fertilizer/grain response ratio was 8.3 to 1. By the 1970s it had fallen to 5.8. Some countries, such as Argentina and India, still apply relatively little fertilizer and so have quite high response ratios. But worldwide the return on the use of additional fertilizer is on the way down.

At some point, biological constraints on crop yields will make the substitution of fertilizer for cropland increasingly difficult and costly. When this is combined with the projected long-term rise in real cost of the oil and natural gas used to manufacture, distribute, and apply chemical fertilizer, the difficulty in restoring the steady upward trend in *per capita* grain production of 1950-73 becomes clear.

With grain, as with oil or any other basic resource, excessive world dependence on one geographic region for supplies is risky. As the North American share of world grain exports has increased it has surpassed the Middle Eastern share of oil exports and made the world more dependent on one region for its food than ever before.

This extraordinary dependence on one geographic region for grain supplies is a historically recent phenomenon.

As recently as the late 1930s, Western Europe was the only grain-deficit region and Latin America was the world's leading grain supplier, exporting some nine million tons per year. North America and Eastern Europe (including the Soviet Union) each exported five million tons of grain annually. Even Asia and Africa had modest exportable surpluses.

By 1950, the shift from regional grain surpluses to deficits was well under way and the outlines of a new world grain trade pattern were beginning to emerge. Today, with North America's unchallenged dominance as a grain supplier, international grain trade bears little resemblance to that of the 1930s.

The restructuring of world grain trade over the last generation has resulted in part from soil erosion problems and in part from differential population growth rates, as a comparison of North America and Latin America shows. During the late 1930s, Latin America had a larger grain export surplus than North America, but the region's more rapid rate of population growth soon changed this. Indeed, if the regions had grown at the same rate since 1950, North America's population in 1983 would be so large that it would consume the entire grain harvest, leaving little or none for export. And North America, too, would now be struggling to maintain food self-sufficiency.

Today the countries with significant exportable surpluses of grain can be counted on the fingers of one hand—the United States, Canada, Australia, Argentina, and France. Of these, the United States accounts for over half and with Canada covers close to 70 per cent of the total.

This overwhelming dependence on one region, and on one country in particular, brings with it an assortment of risks. To begin with, both the United States and Canada are affected by the same climatic cycles. A poor harvest in one is often associated with a poor harvest in the other. When reserves are low, even a modest fluctuation in the region's exportable grain surplus can send price tremors through the world food economy.

Countries that rely on North American food should take heed of the philosophical debate emerging within the United States about the wisdom of mining the nation's soils to meet the ever-growing world demand. Both agricultural analysts and environmentalists argue that the country should make whatever adjustments in its agricultural practices are needed to protect the resource base, even though this would reduce the exportable surplus.

Some argue that it makes little sense to sacrifice a resource that has been a source of economic strength since colonial days merely to buy a few billion barrels of oil. And some contend that the current generation of farmers has no right to engage in the agronomic equivalent of deficit financing, mortgaging the future of generations to come.

The current trend is fraught with risks, both for those whose livelihoods depend on sustained land productivity and for those in countries dependent on food imports that eventually will dry up if the mining of soil continues. Even for the importers, reduced supplies in the short term and less pressure on North American soils would be better than losing the region's export capacity over the long term.

One of the most useful indicators of the world food situation is the food security index, which incorporates both grain carryover stocks and the grain equivalent of idled cropland. This combines the world's two basic reserves of food and expresses them as days of consumption, a concept readily understood by policymakers everywhere.

The two components of the index differ in important ways. Carry-over stocks, the grain in storage when the new crop begins to come in, are readily accessible and require only time for shipping arrangements to be made and for transport. Idled cropland, on the other hand, can take a year or more to be converted into food by farmers.

The food security index measures the adequacy of food supplies at the global level and thus the broad potential for responding to national shortages, but it says nothing about conditions within individual countries. Here the best indicator, of course, is the nutritional state of a country's population.

Assessing nutritional adequacy requires some knowledge of how the national food supply is distributed. But a lack of data on distribution makes it very difficult to estimate the extent of malnutrition, thus leaving the subject open to continuing debate.

The only time a decline in nutrition shows up officially is when it is severe enough to affect mortality. When this happens a country is facing famine, the most obvious and severe manifestation of food insecurity. Using this criterion, inadequate though it is, developments over the past decade have not been encouraging.

From the postwar recovery years until the early 1970s, famine virtually disappeared from the world. Except in China, which now admits to a massive famine in 1960-61, when it was largely isolated, the world enjoyed a remarkable respite from famine for a quarter of a century. Whenever famine did threaten, the United States intervened with food aid, even when it required nearly

Photo © *Vivant Univers*, Belgium

one-fifth of the U.S. wheat crop two years in a row, as it did following monsoon failures in India in 1964 and 1965.

By the early 1970s, however, food deficits were widening and famine was unfolding in several African countries and in the Indian subcontinent. Several famines claimed hundreds of thousands of lives, providing a grim reminder of the fragility of food security even in an age of advanced technology. Most were the product of drought and a failure of international food relief mechanisms.

During the late 1970s world reserves were rebuilt and, except for strife-torn Kampuchea, famines subsided—only to return in 1983, a year of widespread climatic anomalies. The capacity of poor countries with falling *per capita* food production and deteriorating soils to withstand drought and floods has lessened. As a result, more countries than ever before face the possibility of famine in early 1984.

Among the threatened countries are Bolivia and Peru in Latin America, and over a score of countries in Africa. An FAO team of agronomists assessing the food situation in Africa in late 1983 identified 22 countries where crisis seemed imminent—Angola, Benin, Botswana, Cape Verde, Central African Republic, Chad, Ethiopia, Gambia, Ghana, Guinea, Lesotho, Mali, Mauritania, Mozambique, Sao Tome and Principe, Senegal, Somalia, Swaziland, the United Republic of Tanzania, Togo, Zambia, and Zimbabwe. The team of experts concluded that four million tons of emergency grain supplies would be needed to avoid starvation among the 145 million people living in these countries.

There is no simple explanation of why efforts to eradicate hunger have lost momentum or why food supplies for some segments of humanity are less secure than they were, say, 15 years ago. Declines in food security involve the continuous interaction of environmental, economic, demographic, and political variables.

Some analysts see the food problem almost exclusively as a population issue, noting that wherever population growth rates are low, food supplies are generally adequate. Others view it as a problem of resources—soil, water, and energy. Many economists see it almost exclusively as a result of under-investment, while agronomists see it more as a failure to bring forth new technologies on the needed scale. Still others see it as a distribution problem. To some degree it is all of these.

The issue is not whether the world can produce more food. Indeed, it would be difficult to put any foreseeable limits on the amount the world's farmers can produce. The question is at what price they will be able to produce it and how this relates to the purchasing power of the poorer segments of humanity. The environmental, demographic, and economic trends of the 1970s and early 1980s indicate that widespread improvements in human nutrition will require major course corrections. Nothing less than a wholesale re-examination and re-ordering of social and economic priorities—giving agriculture and family planning the emphasis they deserve—will get the world back on an economic and demographic path that will reduce hunger rather than increase it.

■ **Lester R. Brown**

Traditional cereal storage silos in Upper Volta. Crop losses occur at every stage of the chain from the field to the table. Losses of cereals in storage due to rodents, insects, birds and moulds are estimated to have been around 70 million tons, or 10 per cent of the food production of developing countries in 1982.

Children in peril

by V. Ramalingaswami

THE British economist Barbara Ward spoke of two environments—"the inner environment of biological health, full creativity and mental development and the outer environment of culture, stimulus and beauty, of shared affection and civil security". How can we bring about a harmonious development of these two environments for the world's children?

Developing countries are not a homogeneous entity. They are at various stages of socio-economic development, and are developing at various speeds, but they all face one most important problem—high infant and child mortality rates and morbidity. In India for example the infant mortality rate is around 129 per thousand live births, more than 50 per cent of infant deaths occur within the first month of life, and low birth weights are found in almost a third of all births. For mothers under twenty years of age, the birth weights are significantly lower than for mothers from twenty to twenty-four years of age. The frequency of low birth weight increases with rising birth orders.

The story of infant and child health in the Third World is one of needless illnesses, of avoidable disabilities and of missed human opportunities. Acute diarrhoeal disease is the leading cause of death in children under one year of age. Malnutrition, overcrowding, lack of protected water supplies, poor environmental sanitation and low levels of education all act together in a vicious cycle.

When oral rehydration with glucose-salt mixture is instituted early, the death rate from this group of disorders can be brought down dramatically within a short period of time. One oral rehydration solution can now be used to treat most cases of watery diarrhoea, irrespective of the causative agent—virus, vibrio or bacterium. The goal is to make oral rehydration therapy a home remedy so that in the not-too-distant future the bulk of diarrhoeal diseases may be no more than a mere nuisance managed by the mothers themselves in their homes.

Many factors combine in the form of a chain reaction to perpetuate protein-energy malnutrition as one of the most endemic and intractable nutritional disorders of the Third World. These factors include deficient intake of food, diarrhoea and other common childhood infections, the attitudes and perceptions of mothers, traditions and taboos with regard to infant feeding practices, and poverty with all its ramifications.

This vast problem has still not been tackled effectively. The supplementary feeding programmes of the past few decades have had remarkably little success in bringing about lasting changes in the attitudes of mothers towards providing the best possible nutrition for their children. Protein-energy malnutrition is a problem that calls for coordinated multi-sectoral action to deal with the convergence of poverty and unemployment, of disease and illiteracy accentuated by rapid population growth. These issues are in turn linked to cultural factors, economic distortions, human inequalities and social injustices.

Action should be carried out within the health sector to provide a package of integrated services wherein nutritional and health care services, especially infection control measures, are combined. Efficient surveillance, early diagnosis and simple treatment of common childhood infections can be carried out by village volunteers and mothers, who should be regarded as first among front line health workers.

Certain illnesses can be remedied by simple and inexpensive "magic bullets" (see also article overleaf).

• *Nutritional blindness* affecting young children is a problem that can be resolved by increasing the intake of either preformed vitamin A or of pro-vitamin A in the form of green leafy vegetables as a regular part of the diet. Pending this long-term solution, it has been shown by Indian workers that giving massive doses of vitamin A every six months to children under the age of five is a feasible method of controlling this deficiency.

• *Endemic goitre* which afflicts an estimated 200 million persons, mostly in the Third World (including 40 million in India alone) can be treated by the simplest and cheapest public health measure known to man—iodized salt. Injected or administered orally, iodized salt will not only control goitre but when given to pregnant women will eliminate the developmental disorders of deaf mutism and cretinism which are associated with severe forms of iodine deficiency. But in spite of their cheapness, programmes to control goitre are not working effectively in many parts of the developing world.

• *Nutritional anaemia* is essentially the result of an iron deficiency which can be made good by a periodical supplementation of the diet with an iron-containing tablet or, as has been shown by Indian workers, by the fortification of domestic salt with a small quantity of iron.

It is in the application of what we know that we are failing more than in the discovery of new knowledge. We need to carry out serious social science research in order to identify the behavioural factors which influence the acceptance and diffusion of a given technology. The health history of the world teaches us that there is a direct relationship between improvement in socio-economic status and reduction of infant mortality rates. It is futile to believe that a health system can function outside the overall developmental processes. The maximum health benefits can be derived from development when health activities are integrated into activities in other sectors.

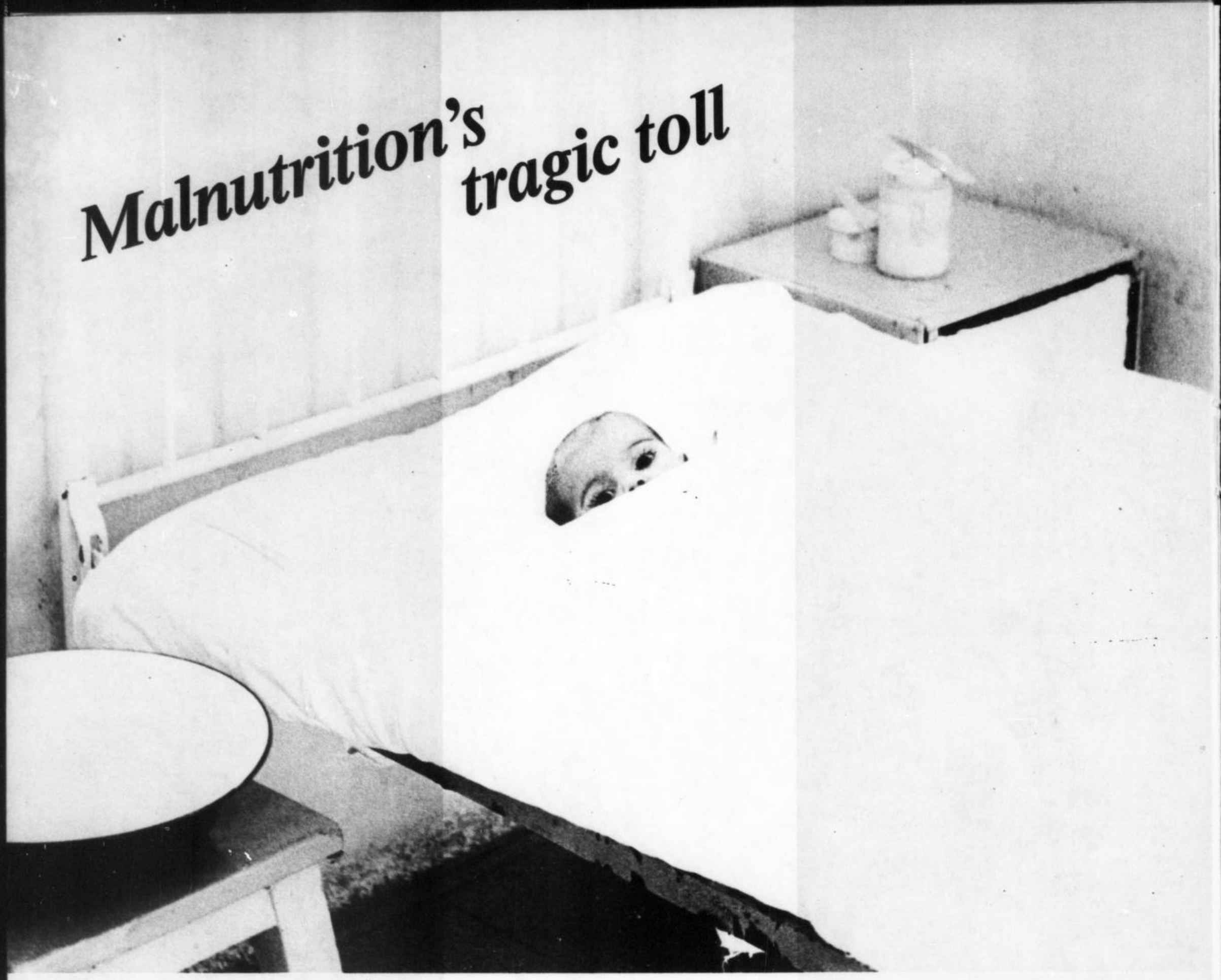
In the Third World experience during the past two decades has shown that with able leadership, well-designed and effectively operated programmes, appropriate technologies and forms of health-care delivery together with professional back-up support, infant mortality rates can be reduced by 50 per cent or more even by poor countries, in a relatively short period of time and at a cost less than the equivalent of 2 per cent of annual per capita income.

■ **V. Ramalingaswami**

V. RAMALINGASWAMI *is Director-General of the Indian Council of Medical Research, New Delhi.*

Photo © Herzog/Present Essen, Fed. Rep. of Germany

Malnutrition's tragic toll



Source: Nutrition Education: Curriculum Planning and Selected Case Studies, *No. 3 in Unesco's* Science and Technology Education Series.

THE most important nutrition problem in developing countries affecting infants and young children is that of protein energy malnutrition. Most frequently this occurs as the complex result of an inadequate diet in a deprived environment. Families often do not have sufficient knowledge of the nutritional health needs of infants and small children.

Once the nutritional status of a young child starts to deteriorate a vicious circle of malnutrition and infection is set up. Infections interact with nutrition by decreasing the resistance of the young child, by lowering his normal food intake and by diminishing utilization of nutrients from the food. A large number of children can be expected to be suffering from an acute or chronic infection during a considerable part of their first years of life.

Other nutritional problems arise from specific vitamin and mineral deficiencies. The principal problems are associated with lack of Vitamin A and Vitamin D, and the mineral salts iodine and iron/folate. Severe lack of Vitamin A in the diet gives rise to blindness and the disease is known as **xerophthalmia.** Lack of Vitamin D causes the disease known as **rickets** which affects the bones of the body and causes bending of the leg bones in particular. Lack of mineral salt iodine causes endemic **goitre,** and lack of iron in the diet gives rise to **nutritional anaemia.** Anaemia may also occur as a result of lack of folic acid in the diet and is usually combined with lack of iron.

Nursing mothers and young children are the most vulnerable to Vitamin A deficiency, especially if they live in areas where the staple food used for the weaning diet consists primarily of rice, maize or cassava and where small amounts of animal foods, leafy vegetables and fruits are eaten. **Xerophthalmia** is called a "disease of darkness" because an early symptom is nightblindness or difficulty in seeing in dim light. This eye disease is prevalent in Asia, Africa, South America and the Caribbean. Once the sight has been destroyed, and this can happen with great rapidity, nothing can be done to restore the child's vision.

Yet in most countries where this blinding malnutrition is serious there exists a cheap supply of Vitamin A, in green, leafy vegetables. Because of custom and ignorance, many of these vegetables are not introduced to children's diet by the mothers or other caretakers of the children. The task is to persuade them to do this through nutrition education. (See article page 29).

Fat is needed for the absorption of a substance called carotene which is found in the green leaves and from which the body manufactures Vitamin A. The carotene taken by the mouth in the green vegetables

Photo © Fee Schlapper, Baden-Baden, Fed. Rep. of Germany

Photo George Nehmeh, UNRWA

Photo Munir Nasr, UNRWA

may not be absorbed into the blood and does not reach the body cells if the weaning diet is lacking in fat. Palm oil, cottonseed oil and other food oils locally available can be used to mix the staple food which is the basis of the weaning diet for the baby.

Rickets is caused by a shortage of Vitamin D, together with a poor diet, so that there is not enough calcium present in the blood stream for calcification of the bones. If the bones are not properly calcified then they remain soft and when the baby begins to walk the leg bones bend under his weight. Rickets again is a child's disease and is highly endemic in some regions of the world. Cases of rickets are not usually fatal but the deformities can be permanent. Bow legs or knock knees are only one symptom of rickets. Vitamin D can be supplied from such foods as fatty fish and eggs. It can also be made in the skin under the influence of ultra violet light from sunshine. Exposure of the child's body and limbs to afternoon sun in the tropics can heal and prevent symptoms of rickets. Milk powder and baby foods, as well as margarine, enriched with Vitamin D should be utilized.

Endemic goitre is a widespread disease and has been reported from all areas of the world. It appears in early childhood and progresses into adolescence and sometimes adulthood. Women of childbearing age are of particular concern. Goitre is caused in some areas by a deficiency of iodine in the soil and water. Iodized salt has been proved successful in eliminating goitre in different regions. The total population under risk is estimated at 400 million.

Nutritional anaemia caused by iron deficiency is probably the most common form of specific nutritional deficiency in the world today. It affects mainly young children and women of child-bearing age. Evidence also suggests that nutritional anaemia adversely affects the productivity of workers. Iron is needed to form blood. People who suffer from anaemia cannot supply enough oxygen to their tissues. They are lethargic, sluggish and easily fatigued. They lack concentration, get out of breath on even slight exertion and lack vitality. Anaemia occurs when there is a prolonged loss of blood, or failure of absorption or a dietary shortage over a very long period.

Suckling anaemia has been known in many parts of the world. Babies in tropical areas may have a low haemoglobin count as early as three months of age. Normally the baby receives enough iron from the mother for the first six months of life, but if the mother has suffered from iron deficiency in the last months of pregnancy, the baby does not get its full quota. Poor absorption of iron may account for some of the deficiency. Frequent attacks of malaria and parasitic diseases will cause a temporary anaemia. This will pass if the child is receiving enough protein and iron in the diet.

Anaemia due to deficiency of folic acid may also occur. It is less frequent and usually combined with iron deficiency. It is generally associated with pregnancy. Folic acid is a problem nutrient. There are very heavy demands by the body for this vitamin during pregnancy when the diet has to provide four to eight times as much as the normal quantity required. Folic acid is a water soluble vitamin of the B complex and is needed for blood cell formation as well as protein production in the body. It also contributes to the formation of the material of which chromosomes, the genetic mechanism of cells, are composed. Good sources of folic acid are: yeast, liver, spinach and lettuce. Poor sources which nevertheless make some contribution to the diet are milk, poultry, eggs and meat. A larger consumption of animal products is needed, and a decrease in the infestation rates with parasites that cause loss of iron from the food and system. ■

Described by UNICEF (the United Nations Children's Fund) as "potentially the greatest medical breakthrough of this century", oral rehydration therapy (ORT) is a simple cure that can save the lives of most of the 5 million children who now die each year from the dehydration caused by diarrhoea. Whereas previously the only effective treatment for dehydration was the intravenous feeding of a saline solution, a child can now be rehydrated by drinking a solution of salts, sugar and water administered at home. So far 34 developing countries have opened factories to produce oral rehydration salts, and total world production is running at approximately 80 million sachets a year. However, says UNICEF, "ORT will not come anywhere near its dramatic potential for saving life and health unless it is also promoted through the primary schools and colleges; through the churches and the temples; through the women's nutrition classes and the workplace;... and through every other channel which can reach out to help link present knowledge to people's needs." Facing page, a children's ward in Amman, Jordan. Above, a child before and after treatment at the UNRWA (United Nations Relief and Works Agency for Palestine Refugees in the Near East) Khan Younis Rehydration Nutrition Centre, Gaza Strip.

food FIRST

by Paul Lunven

A down-to-earth approach to nutrition and rural development

IT is generally accepted that the problem of hunger and malnutrition can only be solved by tackling the root causes, that is to say, by improving the economic and social conditions of the poorest classes of the population. Malnutrition, which is particularly widespread in rural areas but is also to be found in towns, is always directly linked to the development of agriculture. In developing countries which lack mineral resources, agriculture is the chief source of income and employment, an important supplier of food to both town and countryside, and an essential contributor to the foreign trade balance. Responsibility for improving a country's nutritional situation falls, therefore, to those in charge of agricultural planning.

Despite the considerable efforts which have been made in developing countries to stimulate agricultural production and rural development, a large proportion of the population, especially children, still suffer from malnutrition. Although significant progress has been made in productivity, it has not led to a perceptible improvement in food consumption and nutritional levels. According to FAO estimates, about a quarter of the total population in developing countries (excluding Asian countries with centrally planned economies) do not have access to a diet which meets the minimum energy needs of a human being.

Since the vast majority of the malnourished are from poor rural families, farm labourers and small subsistence farmers, it can fairly be concluded that any significant reduction in the prevailing malnutrition can be achieved only insofar as agricultural policies and projects include food and nutritional objectives. Consequently, it must be ensured that the ultimate beneficiaries of development are the most needy and that the benefits of development are primarily applied to eliminating the most glaring deficiencies.

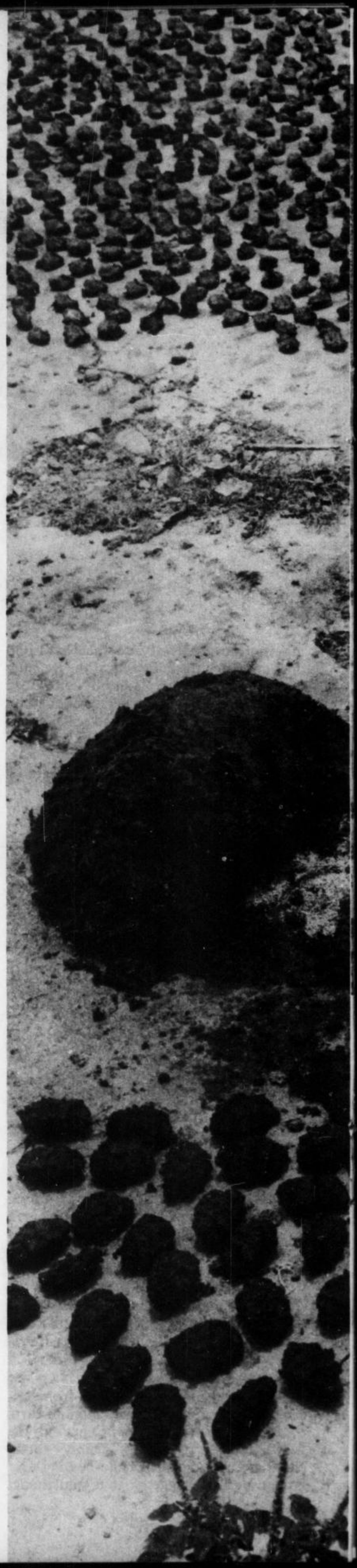
To ensure the future prosperity of the populations concerned, and to achieve a general improvement in nutrition and food consumption, there must be both a reorientation and a better utilization of existing resources, in addition to *ad hoc* nutritional action of the traditional type such as education and supplementary feeding.

Reorientation of agricultural production in order to provide for target groups (certain categories of persons within families and certain categories of families within communities) is one of the most important aspects of development—and one of the most difficult to achieve. It often comes up against political opposition or administrative obstacles. It is necessary to ascertain the activities of the needy groups to be assisted, the kinds of food they eat and the ways in which they provide for their food needs, especially during periods when supplies are difficult to obtain. For instance, the poor generally consume a high proportion of cereals and tubers such as manioc or sweet potatoes, whereas the well-off consume a higher proportion of oils (which provide a large amount of energy) and meat.

Well-off consumers do not suffer from the alternation of the seasons. On the other hand poor farmers, in addition to looking after their own farms, have to work outside during peak periods. Their wives have to do a bigger share of the farm work and there is a danger that the subsistence of the family may become largely dependent on the fruit of the woman's labours. The children are then called upon to help in the fields. In addition to all the problems due to uncertainty of food supplies and the low level of their incomes compared to the hours of work they put in, the poor have to cope with indebtedness, illness and a high rate of infant mortality.

For all these reasons the FAO and other United Nations agencies have for several years been studying the processes which link the food consumption of low-income rural populations to agricultural investment, in order to measure their impact and identify the mechanisms which would enable agricultural planners to take account of food and nutritional considerations in agricultural development work at the project level.

In overall terms it is conceivable that, despite apparently adequate supplies of food at the national level, pockets of malnutrition may persist because of inequalities in the distribution of income. But it is surprising that, in spite of the considerable means applied, well-intentioned aims, and possibilities for permanent supervision of the food chain from production to consumption, projects explicitly aimed at raising the living standards of the rural poor do not succeed in improving the food situa-



PAUL LUNVEN *is Director of the Food Policy and Nutrition Division of the Food and Agriculture Organization of the United Nations (FAO), in Rome.*

Among the poor in the developing countries children are expected to make a contribution to the family budget. This young girl from Bangladesh is fashioning cow-dung into briquettes for use as fuel.

tion of the most needy to any significant degree.

It is necessary, therefore, above all to ensure that projects do not entail negative nutritional effects for the most deprived groups because of the way in which they are formulated or executed.

This has happened in the past in the case of projects which were concentrated on particular groups of producers or particular agricultural products. The poor were completely excluded from these projects. Subsistence food production was completely ignored, or even eliminated, in the concentration of resources.

Other projects have had negative effects on wages, prices and employment, with the result that the purchasing power of the poor declined. When it is considered that up to 80 per cent of their income may be spent on food, it can be seen what effect a decline in income can have, because the remaining 20 per cent cannot be squeezed.

It is true that the negative effects of development projects on family nutrition are quite unintentional, and that their real causes are difficult to identify. When by chance an assessment reveals a deterioration in the situation, it is commonly attributed to such factors as backwardness, ignorance, and traditions. The nutritionist and the sociologist, for their part, strongly criticize the very nature of the project without offering a satisfactory explanation or an alternative solution. A typical case is the introduction of cash crops into regions previously devoted to mixed subsistence farming. This has often been blamed for a recrudescence of malnutrition despite an apparent improvement in living standards.

Nowadays agricultural planners are aware of the dangers which a sharp transition from a subsistence to a market economy can have for small farmers who suddenly find themselves obliged to purchase a large proportion of the food required by the family. Certain measures of a general nature are, therefore, taken in regard to supplies and prices, in order to avoid a sudden deterioration in the family's food supplies. But this is not enough. For instance, one of the things overlooked in plans is the woman's role in supplying the family's food, for women are always regarded as consumers, not producers. But recent FAO studies show that women contribute as much as 60 per cent of the family food supply and that they are almost exclusively both the producers and preservers ▶

Photo © José Mayans, Paris

Photo © Oswald Iten, Switzerland

Photo Hagar Shour © Parimage, Paris

"A woman's work..."

Women play a crucial role in the production, storage and processing of food in most societies. They make up one third of the work force in the developing countries. Women often have well-defined specializations in food production and are increasingly becoming the principal farmers and breadwinners in countries where men migrate in search of work, or where divorce and separation are common. Yet this increased burden of work is not accompanied by a greater share in the taking of decisions. Chores such as the collection of wood and the drawing of water are usually left to the women and despite their importance to agricultural production they face severe handicaps. The excess burden of work on women (the "double day" of farmwork plus housework) also acts as a stimulus to have many children so that they can help out with the chores from an early age. Furthermore, development policies often tend to favour increased production of cash crops (the man's domain) to the detriment of subsistence food crops which are usually the woman's responsibility, so that family nutrition suffers. All this means an extra burden on women, with longer journeys to work on more marginal land and often additional unpaid work on their husbands' crops. Top left, a Kababish nomad woman of the Sudan offers drinking water to her children. Above, women at work in a tobacco field in Zimbabwe. Above right, in the Sahel, a Senegalese woman feeds her baby. Research has shown that mother's milk is not only more healthy and nutritive than other baby foods but also immunizes the infant and helps him or her to resist infection.

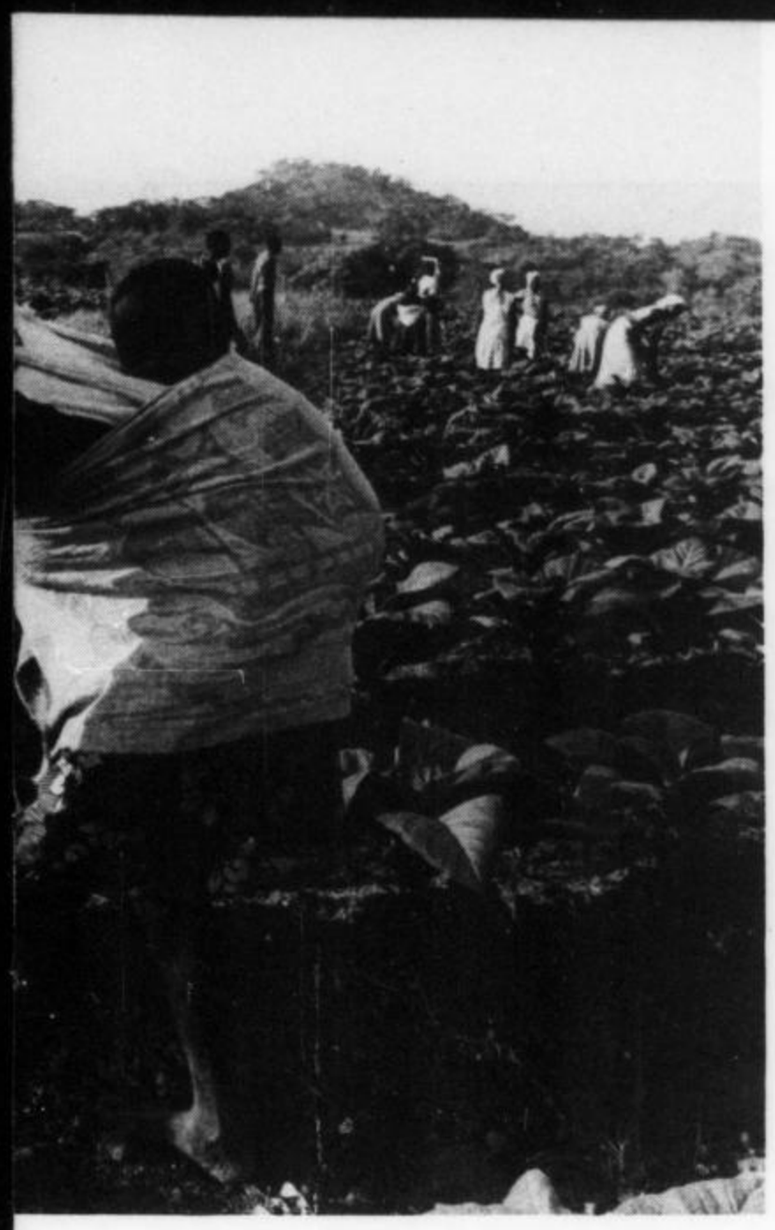
▶of what are commonly called secondary crops.

By eliminating the plots devoted to these crops, or increasing the demand for the female labour necessary to maintain them, the introduction of cash crops has a negative effect on the family's food supply (and the preservation of indigenous plant varieties) despite a substantial increase in cash income. This effect will doubtless be attributed to the woman's lack of education and her consequent inability to manage a budget, whereas the prime reason is ignorance of her essential role in keeping the family kitchen supplied.

Indeed, this explains the failure of so many well-intentioned, carefully planned development projects. After a certain time the "beneficiaries", seeing their food situation deteriorate, either emigrate or go back to traditional subsistence crops.

It can therefore be said that, in general, agricultural and rural development projects whose primary concern is to increase production rates and incomes can have unfortunate results on the nutritional level for the populations concerned. Some of the causes are the preferential allocation of agricultural credit for cash crops to the detriment of food crops; a decline in food production on the lands affected by the project because of a growing scarcity in the amount of land available and because of the demand for labour; an increase in the prices of purchased foodstuffs due to speculation and archaic marketing systems; the appeal of commercial products with a low nutritional value, such as carbonated beverages. To this must be added the fact that it is always the poor farmer who directly or indirectly finances the subsidies on products of mass consumption in the towns.

These facts are now known and documented, but it is nevertheless quite certain that governments whose main source of hard currency is commercial agriculture cannot be expected to sacrifice the latter to meeting the nutritional needs of low-level income groups. This is why the FAO has



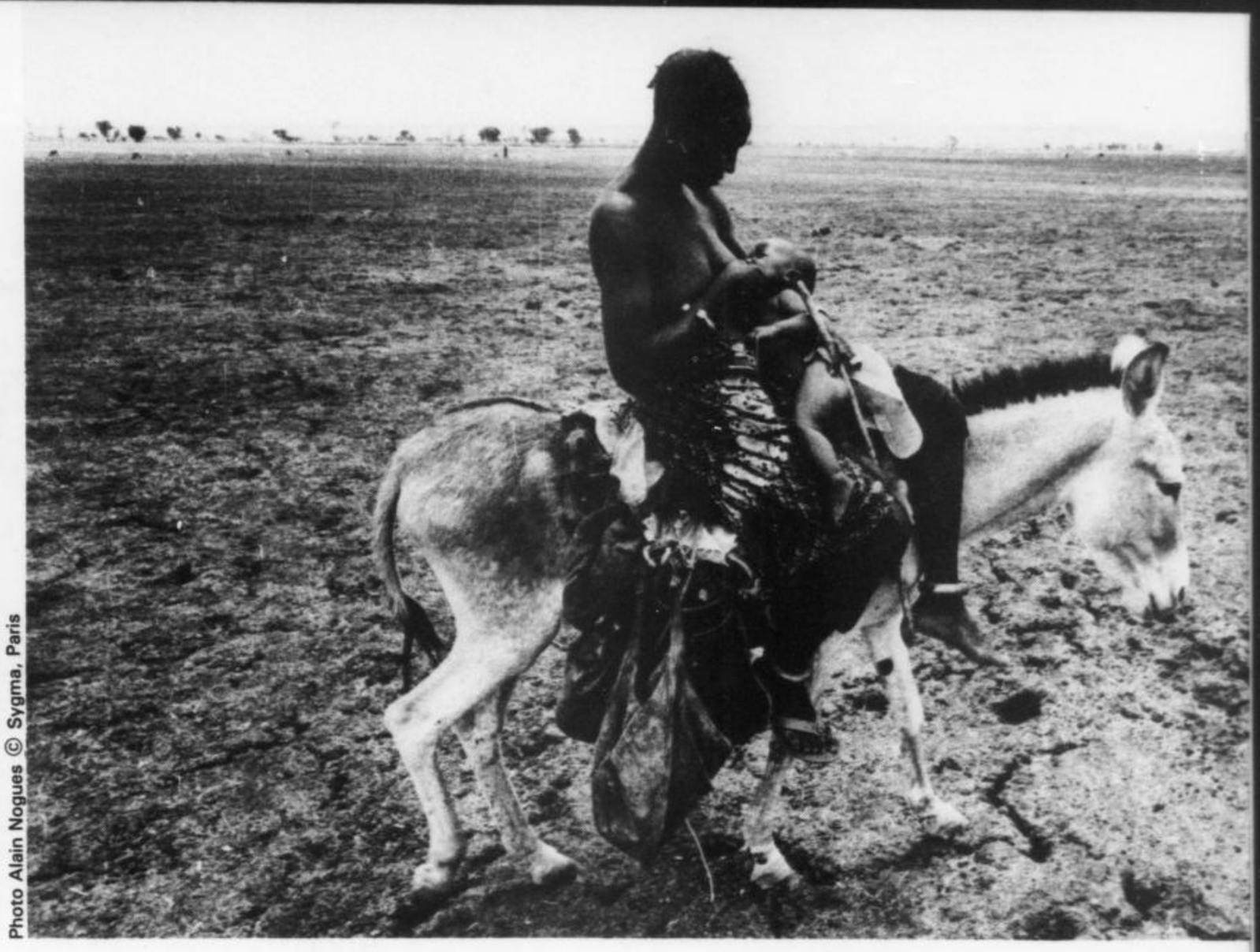


Photo Alain Nogues © Sygma, Paris

taken steps to develop agricultural planning methods which not only identify and eliminate the causes of deterioration in food supplies but benefit from the impetus given by investment in deprived areas, in order to ensure that the living standards of the population, and especially their food supplies, are preserved in terms of quality and improved in quantity.

In the context of this approach the economist must ask whether the project envisaged, irrespective of whether it concerns a food or an industrial crop, will lead to an increase or a decline in the amount of food available in the country; whether food prices will remain stable or will increase, and whether one or other of these factors will have negative effects on nutrition. These questions may seem simple, but the answers are not, especially if production targets are considered to be imperative and must not be sacrificed.

Many experts are at present considering how to assist the agricultural planner by supplying him with the tools which will enable him to achieve the ideal compromise between economic and social development.

This work is only in its early stages, but initial results seem to confirm that agricultural and rural development projects offer encouraging prospects for improving the food and nutritional situation in developing countries.

Of course, if we recall the resolution adopted by the World Food Conference just ten years ago that "all governments must ensure that by 1984 no man, woman or child will go to bed with an empty stomach", we cannot but deplore the meagre results obtained during this period. It is not the purpose of this article to dwell upon the impact of the world crisis and over-armament on the poor in developing countries. However it can be said that the essentially economic view of the campaign against hunger and mulnutrition which prevailed until recently is slowly changing.

The days are over when the only criteria of success were an increase in production and an improvement in national income. While these are still prime objectives of agricultural and rural development, the fact remains that today, despite all the inadequacies of which we are aware, man is no longer regarded only as an agent of development, but as its first and ultimate objective.

■ **Paul Lunven**

World Food Day

Drawing Riadh Rouissi, FAO, Rome

In 1979 the 147 nations represented in the Conference of the Food and Agriculture Organization of the United Nations decided to establish World Food Day on the anniversary of the founding of the FAO, 16 October 1945. The purpose of the Day, which has been observed annually since 1981, is to heighten public awareness of the nature and dimensions of world food problems and to develop a sense of national and international solidarity in the struggle against hunger, malnutrition and poverty. In 1983, the third World Food Day was celebrated in over 140 countries by a wide array of activities ranging from art and essay competitions, to seminars on food problems and fund-raising appeals in favour of agricultural development projects. Left, a painting by 11-year-old Tunisian schoolboy Riadh Rouissi, won first prize in an art competition on "world food security", theme of the third World Food Day. Over a thousand children took part in the competition, which was organized by the magazine **Jeune Afrique** ***with the collaboration of FAO.***

AFRICA

The hunger belt

IN the 1970s, sub-Saharan Africa had the highest rate of population growth of any area in the world; furthermore, the rate of increase is still accelerating, whereas in all other developing regions it is tending to slow down. Food production, on the other hand, is increasing more slowly than in other tropical and sub-tropical areas.

As a result, Africa is the only region that is currently losing the race to keep food production ahead of population. The figures clearly bring out the drop in *per capita* production, but they also show that the results achieved during the 1970s were inadequate only in relation to the growing numbers of people to be fed. In terms of total production, the increase was greater than in the developed countries.

The attention of the international community is being increasingly directed toward the "African food problem". In fact, a series of separate problems, rather than a single pattern of difficulties, underlies the disappointing performance of agriculture in tropical Africa. The situation varies widely by crop, by country and by agro-ecological zone.

In the production of staple food crops, the record since 1969-71 contains more failures than successes. Four of the largest producers of millet south of the Sahara saw their output drop in absolute terms, as did five of the largest sorghum producers, four of the largest rice producers and six of the largest maize producers. In relatively few cases did production growth exceed the increase in population. Only in cassava was there no decline in production, although only four of the large producers managed to keep output ahead of population during the 1970s.

In some cases, declining production can be attributed to war or political instability. But many other factors have also been at work: the inherent difficulties of farming on fragile soils subjected to violent but irregular rainfall; lack of economic incentives; the migration of rural people (especially the young) to the cities.

Of forty-one sub-Saharan countries with a significant agricultural sector, only five (Cameroon, Central African Republic, the Ivory Coast, Rwanda and the Sudan) have kept food production consistently ahead of population growth in recent years. At the other end of the scale, countries in which food production per person dropped by more than 20 per cent between the start of the 1970s and 1982 include Angola, Gambia, Ghana, Mauritania, Mozambique, Senegal and Somalia.

The African food-deficit countries have made up their shortfalls by imports, particularly of cereals, and among cereals mainly of wheat. Urban and to a lesser extent rural populations have developed a taste for bread made from wheat flour, which offers considerable advantages over traditional foods in terms of convenience, and also has higher prestige. Yet wheat cannot be grown in the temperature regimes prevailing in most of Africa outside the eastern highlands. An escape from this "wheat trap" is being sought through technology for the processing of local crops, including cassava and traditional cereals. It is hoped that wheat flour can be at least partially substituted by local products in ways that will prove acceptable to townspeople. Rice, on the other hand, is well suited to tropical environments; however, production has been rising more slowly than demand, and imports have been soaring.

Cereal imports into sub-Saharan Africa are still below the average for developing countries in *per capita* terms. But they have been growing fast, doubling every seven years approximately. And they are already large in relation to the ability of low-income countries to finance food imports. In 1981, the region imported over 12 million tons of cereals, at a cost of about $2.5 billion. This absorbed over 27 per cent of the total receipts of all sub-Saharan developing countries from the export of agricultural, forestry and fishery products—the main source of foreign exchange apart from oil and mineral exports. Imports provided more than a fifth of total cereal supplies.

If the food situation in sub-Saharan Africa was difficult in 1982, it begins to look really alarming when recent trends are projected into the future. World Bank projections show the population of the developing countries south of the Sahara as quadrupling between 1980 and 2020. By the latter year, the population of Nigeria could be about 340 million, Zaire some 95 million and Kenya approximately 80 million. On the basis of food production trends in the 1970s, sub-Saharan Africa would be able to feed from domestic sources little more than half of its population. The food deficit in the year 2020 would correspond to the entire present-day agricultural production of India.

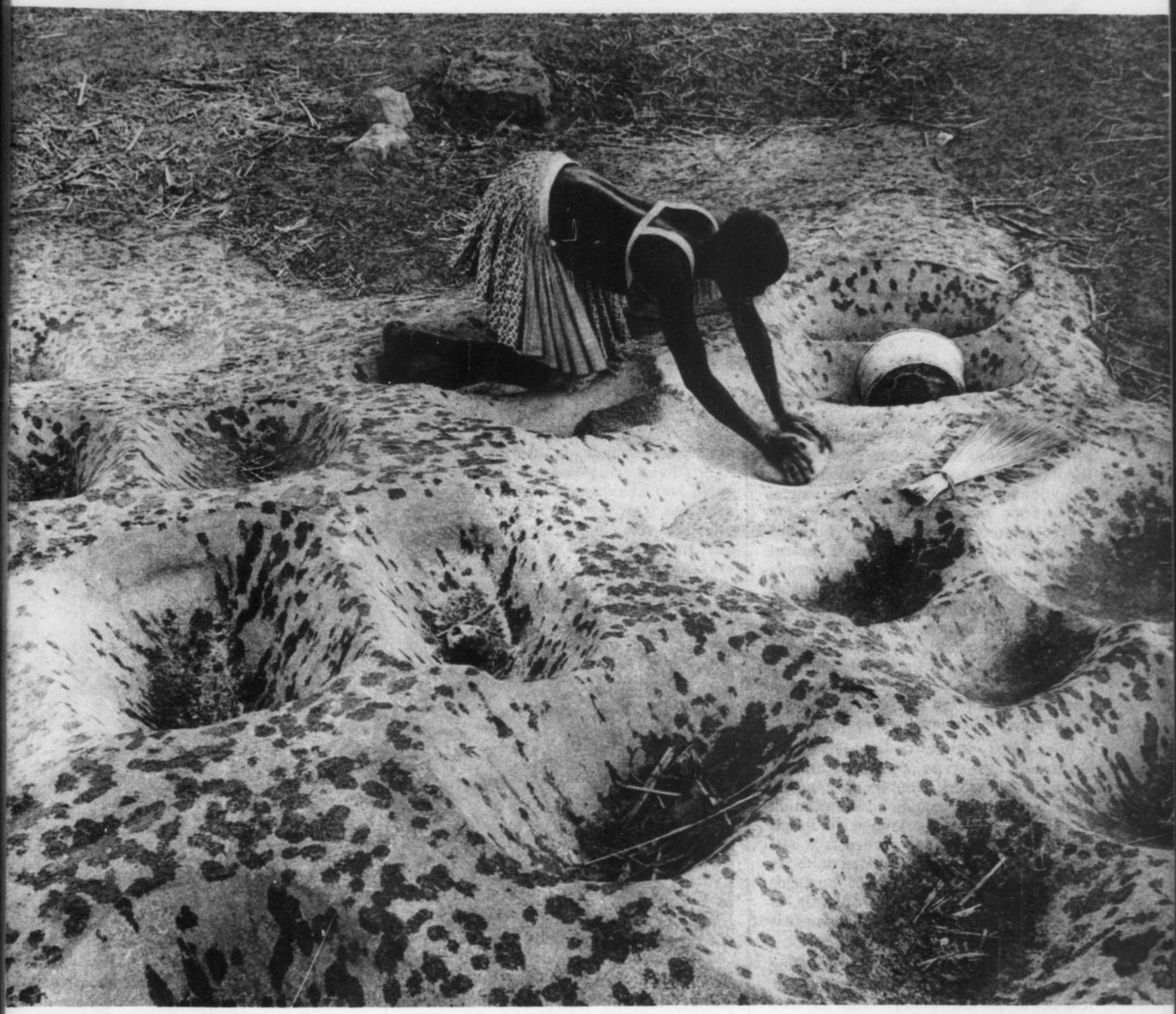
Even over the shorter term the picture looks grim. Few countries can continue to cover mounting food deficits with corresponding increases in cereal imports. Indeed, the general economic situation is forcing countries to cut back on food imports, rather than step them up. Food supplies per person will inevitably fall if deficits cannot be made up by imports or by food aid. Nutrition levels are, therefore, likely to come under increasing pressure, and the danger of worsening malnutrition on a wide scale should by no means be underestimated.

Nevertheless, there are certain plus-factors which can justify a measure of optimism. Foremost among these are the underestimated versatility and skills of the African farmer. His readiness to innovate is clear from the fact that many of the food and export crops most widely grown have been introduced from outside Africa in modern times. Furthermore, traditional cropping systems are frequently elaborate and—within their limits—efficient. The difficulty is that they were developed over many generations to feed an approximately stable population, and do not lend themselves to sustained increases in productivity. Indeed, no fully satisfactory approach has yet been found for continuous and intensive cropping under the agro-ecological conditions that prevail in much (though not all) of tropical Africa. There is a technological gap, particularly with regard to soil management and labour productivity, which must be filled before the African farmer can cope with the food needs of the continent.

Technology, however, is not all. Agriculture can prosper only in a favourable policy environment. At the time

Photo © Oswald Iten, Switzerland

This text is taken from World Food Report 1983, *one of a series of annual briefings on the world food and agricultural situation prepared by the FAO.*



Centuries of grinding sorghum have left their moulds in the rocks of Lafon, southern Sudan. The Sudan is one of the few countries of sub-Saharan Africa which have kept food production ahead of population growth in recent years.

of their independence, many African countries appear to have seriously underestimated both the importance and the difficulties of the agricultural sector. As a result, domestic food production has seldom been given the priority it needed.

In a broader context, a bias against agriculture generally, and food production in particular, has become built into the socio-economic structure of many African States, and affects such fundamental issues as exchange-rate and taxation policies, relative price levels, and priorities for the development of infrastructure. It is reflected also in the relatively low prestige attached to work in the farm sector. If food production is to find a new vitality, many countries will have to alter profoundly the attitude toward agriculture held not only by planners and politicians but also by the population as a whole.

The international community, for its part, must find new ways of helping Africa to help itself. Investment and technical assistance are vitally needed, but a multiplicity of small projects, each with its own administrative requirements, can place disproportionate demands upon government services which are desperately short of trained people. Ways must be found of helping governments to redress the balance of economic power in favour of food producers, without precipitating a revolution in the cities. And it must be recognized that, if the African food crisis has been developing for twenty years, it may well take just as long to resolve.

The gravity of the situation has been fully recognized within Africa, for instance in the Lagos Plan of Action adopted in April 1980 by the members of the Organization of African Unity. A framework for action within Africa and by the international community is contained in FAO's Regional Food Plan for Africa. Many studies have been made by other organizations, notably the World Bank, and there is no shortage of analysis and prescription. However, there is as yet no clear evidence that the tide has started to turn. Africa south of the Sahara remains the world's principal food-problem area. ■

Seeds of **plenty**

The promise of biotechnology

OVER the past twenty-five years, total world agricultural production has doubled. Nevertheless, the problem of ensuring adequate nourishment for the world's growing population is still exceptionally acute. The Director-General of the Food and Agriculture Organization of the United Nations (FAO), Edouard Saouma, recently declared that if present rates of impoverishment in the developing countries continue, the number of people suffering from hunger in the world will reach 750 million in the year 2000. But at nearly 500 million, 30 per cent of whom are children under ten years old, it is already quite high enough and is fraught with serious risks for the physical and mental development of future generations.

In an uneasy world, the food problem is aggravated by a series of social, economic and political factors, from the unequal or, to be more exact, inequitable distribution of goods to the often primitive conditions of production and processing of agricultural output. It is impossible today to achieve an increase in production yields per hectare of land, per head of cattle, or per ton of raw material unless advantage is taken of the latest scientific discoveries.

Nowadays production, including agricultural production, is becoming a science in its own right, with its own theoretical applied, practical and inventive aspects. The very development of agriculture, for instance, has led to many scientific discoveries such as fertilizers, insecticides, new means of plant protection, new species and varieties of farm animals and crops. All man's inventiveness was required to solve the problems of supplying water to farms and meeting their energy needs. Science —largely the biological sciences—has enabled agriculture to obtain record harvest yields, to produce strains of livestock of previously undreamed-of productivity, and to bring about "green revolutions".

In recent years work has intensified in many countries in the fields of cellular biology, physiology, the biology of growth, ecology and, above all, in those branches of physics and chemistry concerned with the study of the vital processes of organisms at the level of their molecular structures. The improvement in agricultural productivity is in large part due to genetics, to which we are indebted for many valuable varieties of plants, strains of livestock and productive families of micro-organisms.

Between 1976 and 1980, for example, in the USSR alone, 723 new agricultural plant varieties were perfected and introduced to certain regions of the country noted for their unfavourable climate and which statistics show to be characterized by far from propitious weather conditions during the planting and harvesting periods. A further 3,000 varieties were sent for quality testing at State experimental stations.

At the present time, Soviet scientists are busy working out theoretical bases for the selection of methods of creating new varieties, such as mutagenesis induced chemically or by irradiation, polyploidization and hybridization, and the preservation of genotypes.

Thanks to the chemical mutagenesis method, more than a hundred varieties of

Merino sheep are prized for the quality of their wool. These specimens raised on a State farm in the north of Soviet Kazakhstan yield from 5.3 to 6.3 kg of wool and weigh between 95 and 115 kg.

Photo © Tass, Moscow

YURI OVCHINNIKOV, *of the USSR, is a specialist in the field of bio-organic chemistry whose work has earned him many awards, including the Lenin (1977) and State (1982) Prizes for science and technology. A vice-president of the USSR Academy of Sciences and head of the Academy's Shemyakin Institute of Bio-organic Chemistry, he is the author of over 250 articles and studies, including a famous monograph on* Active Complexes of the Membrane.

by Yuri Ovchinnikov

Photo © Tass, Moscow

To increase livestock farming productivity a hybrid race of cattle has been bred in the USSR from the Azerbaijan Zebu (1/8) and the Russian black cow (7/8). Specimen above is 5 1/2 years old and weighs 900 kg.

wheat, rice, oats, maize, sunflower and qther crops have been obtained.

The advantage of this method is that it makes possible the production of completely new forms, previously unknown in plant-breeding, which are resistant to various diseases. From the hybridization of two mutants of sunflower, for example, one which synthesizes oleic acid in place of linoleic acid thus making its oil similar to olive oil, and another having a short stalk which enables a marked increase in sowing density to be achieved, a new strain with a yield capacity of up to 4,000 kilograms per hectare has been obtained. Furthermore, by using irradiation techniques, scientists in the USSR have produced a more productive variety of spring wheat and more than fifteen resistant varieties of cotton plant.

Research development in the field of genetics, selection and pedigree breeding is of the utmost importance for improving productivity in cattle. Among achievements in this field mention should be made of the acclimatization and propagation of the Touvinian yak. Yaks are now being introduced to central Yakutia and it is proposed to breed them later in the Urals and the Far East. Highly productive breeds of sheep have also been created which are adapted to Siberian conditions and to conditions prevailing in the high mountainous regions of Kazakhstan. Work is also proceeding on the cross-breeding of the Russian black breed of meat cattle with the Azerbaijanian zebu.

A new branch of biology, biotechnology—and, in particular, genetic and cellular engineering—opens up unprecedented prospects. Scientists in countries that lead in this field have reached the stage at which it is possible, by following a preconceived plan, to obtain new organisms with valuable characteristics; they have, in fact, become manufacturers of new living systems. Ten, or even five, years ago, such achievements were possible only in the domain of the simpler micro-organisms, and many laboratories throughout the world are making brilliant use of these methods. Today, however, plants and animals are also the subject of experiments which are giving spectacular results.

The cultivation not only of plant cells and tissues but also of isolated protoplasms has become a reality. This makes it possible to overcome physiological incompatibility in the cross-breeding of widely differing plant species. This method involves fertilization in test tubes and the cultivation on artificial nutrient media of isolated embryos and seed-buds of hybrid combinations where there is incompatibility of the parent stock. Cloning of new varieties has made it possible to achieve a threefold or fourfold acceleration of the reproduction span for perennial plants. In this way they become immune from disease and—under certain reproduction conditions—from viruses. Modifications of this kind in the selection process to which reference has been made earlier, are possible for those agricultural crops (rice, potatoes, tomatoes, lucerne, clover, rape, etc.) whose passage from cell to plant is familiar to biologists.

In experiments with mulberry *Bombyx*, Soviet biologists have been the first in the history of science to succeed in obtaining, ▶

Photo © INRA, Paris

China's stock of pigs numbers 310 million and is far bigger than that of any other country. It may also be one of the world's oldest since there is some evidence that pigs were already domesticated in China some 7,000 years ago. Right, 16 piglets of the Mei-shan breed, the first litter of Chinese pigs born in France.

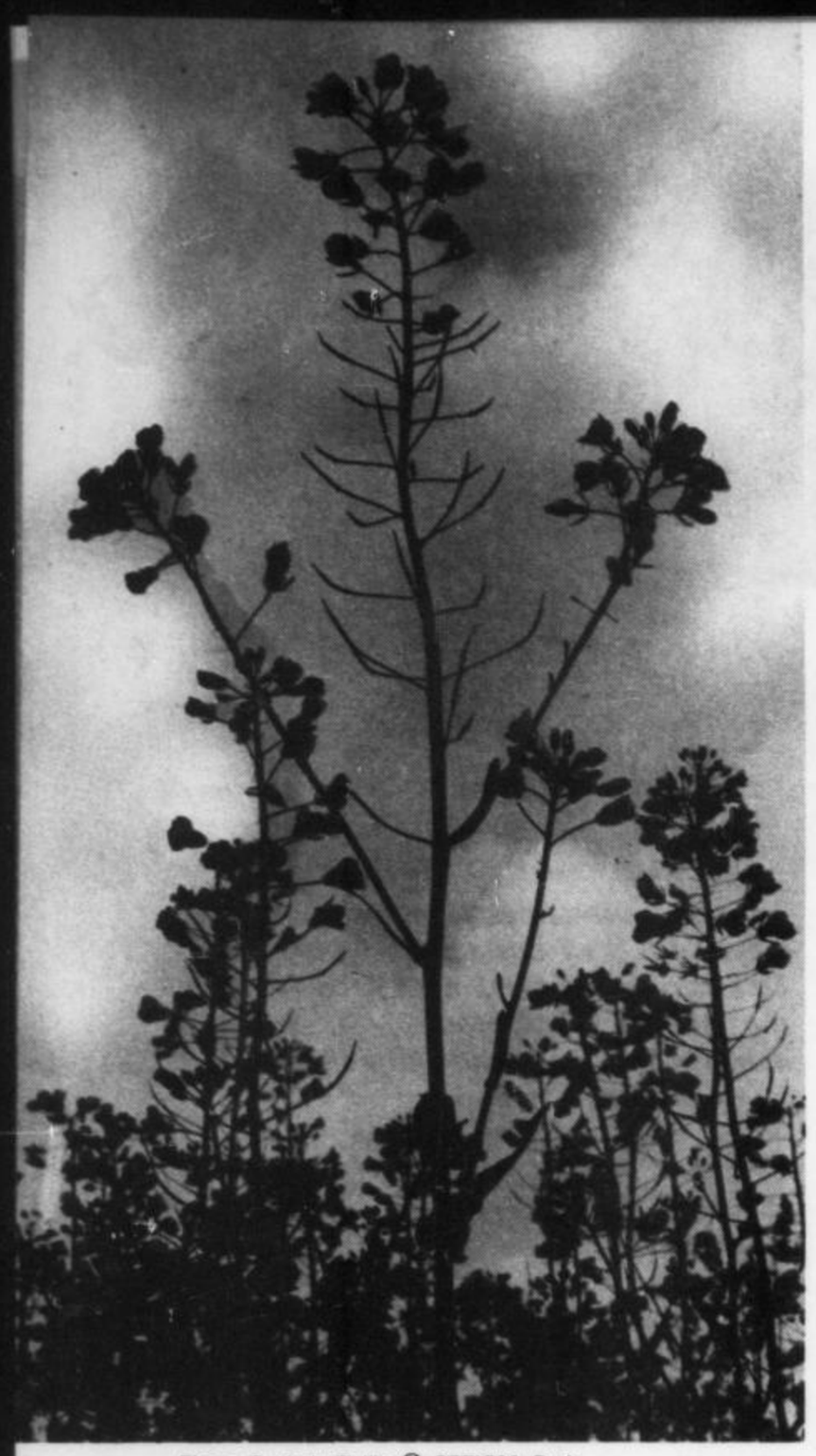
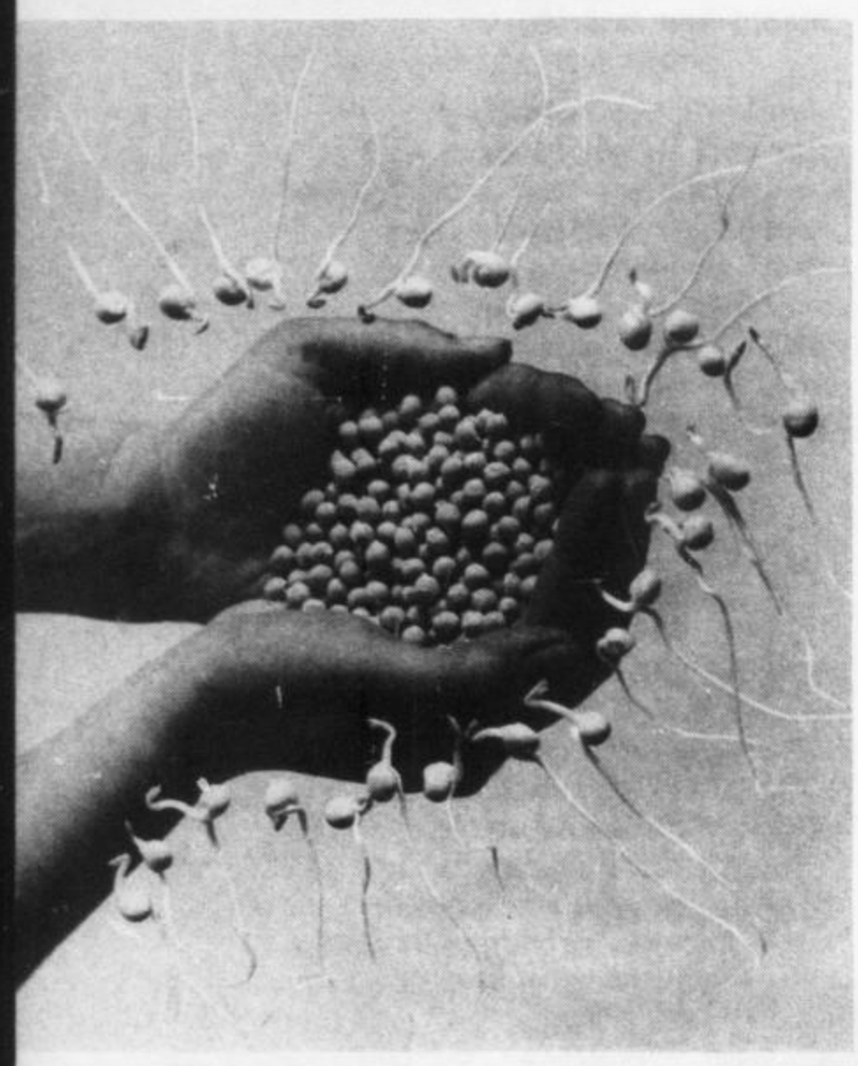


Photo G. de la Taille © CETIOM, Paris



Throughout the world research scientists are working to obtain by selection new varieties of hardy, high-yield cultivated plants. Rapeseed, top, is a source of oil and cattle feed. In France, where rapeseed is grown on some 400,000 hectares, recent research has raised hopes of boosting productivity through a new hybrid variety, the "double zero". Above, a new type of pea, the "Omsky 7" has been developed at the Kolos Centre near to Omsk in western Siberia. It yields up to 40-45 quintals per hectare.

Photo A. Chepurko © Tass, Moscow

▶ on an unlimited scale, genetically identical twins and perfect genetic replicas both of father and mother. A selection scheme has been devised which makes it possible to breed separate individuals in millions of copies remarkable for their productivity, and to reproduce their unique posterity in a series of generations. The problem of sex regulation has been resolved—male silkworms give 20 per cent more silk than males and females taken together. The application of sex regulation methods to agricultural pests could open up new possibilities in the fight against agricultural production losses.

As well as the question of pests—one of the great scourges of agriculture which not infrequently causes enormous losses—mention should be made of the countermeasures against plant and animal diseases, in particular the highly purified vaccines which the USSR provides for many countries.

Special mention should be made of two new methods which have a great future. The first, which has been successfully employed in the diagnosis of virus diseases in particular, is hybridomic engineering—now just as popular as genetic engineering. Scientists have learned how to create hybridomes (cells obtained from lymphocytes and special cancerous cells) which grow at great speed and produce only one previously ordered antibody (in contrast to the multiplicity of different antibodies produced by lymphocytes when a pathogenic agent attacks an animal organism). The second method, recently discovered, offers even greater future prospects. It consists of the use of synthetic preparations (antigens) which are already being referred to as the vaccines of the twenty-first century.

Among the biological methods of combating pests and vectors of infection, the use of pheromones (sexual attractants of insects and other animal species) seems to be very promising. According to WHO statistics, a single grey rat devours up to 30 kilograms and spoils about 150 kilograms of foodstuffs per year, and there are seven thousand five hundred million of them in the world. Pheromones of rodents make catching operations in storehouses several times more efficient.

Another important trend which promises substantial results concerns biochemical methods, especially the study of the polymorphism of albumens. The variability of such important characteristics of plants as productivity, grain quality, resistance to frost, resistance to diseases, is closely related to variations in albumens. A close analysis of the composition and nature of these albumens makes it possible to predict results accurately and to select the best varieties.

In resolving such an important agricultural problem as the production of fodder, albumen insufficiency can be reduced by industrial production of valuable fodder additives obtained by micro-biological synthesis. The scientific basis for such production and a powerful microbiological industry have been created in the USSR. At the present time, experts are engaged in converting the production of fodder protein from oil hydrocarbons of the paraffin type to other raw materials—methanol, methane, natural gas and waste from the timber, food and other industrial sectors. The utilization of wood sawdust and straw, for instance, yields biomass with an albumen content of up to 20 per cent. A means of obtaining consistently high percentages of amino acids by genetic engineering methods has been patented in the USA.

The preservation of stocks of genes (meristems, cells, pollen) of different kinds at a temperature of −196° in liquid nitrogen may become an important new method. The genetic apparatus of plants will itself gradually become subject to genetic engineering. In many laboratories in a number of countries, including the USSR, work is being conducted on the introduction into plants of nitrogen-fixing genes found in tuberous micro-organisms living in symbiosis with leguminous plants, and also of groups of genes responsible for resistance to viral diseases.

While it is obviously impossible to cover the entire field of activity in the biological sciences in such a cursory survey, the problem of soil science cannot be overlooked. Soil is the essential basis of agriculture and without good soil the highest-yield or most productive varieties or strains are of no avail.

Although 14 per cent of the world's agricultural land is in the USSR, more than half of this is situated in climatically unfavourable areas and there is not all that much fertile land. Considerable areas are exposed to wind and water erosion and to salinity. These factors determine the direction of scientific research. Agricultural soil protection systems have been devised and introduced on more than forty million hectares of land. This has made it possible to obtain millions of additional tons of grain annually, to reduce the negative effects of drought and to protect the soil from erosion.

Aerial surveys to determine soil humidity, water-table levels, biomasses of a series of agricultural crops for a given quantity of electro-magnetic radiation of the soil surface in an ultra high frequency wave range, have proved their value. These investigations have demonstrated the great efficacy of teledetection methods for verifying the condition of soil resources, appraising the growth and ripening of crops, selecting objectives for land improvement, detecting disease in agricultural crops, determining the condition of large tracts of forest, and many other operations.

■ **Yuri Ovchinnikov**

INTERDEPENDENCE

'Nationalism provides too narrow a focus for overcoming poverty and hunger'

by Paul Steidl-Meier

PAUL STEIDL-MEIER, *of the USA, is a member of the Society of Jesus and is on the staff of the Pontifical Gregorian University, Rome. He is a specialist in social ethics and in international development, with particular interest in the problems of poverty, hunger and rural development. He is the author of a number of articles and studies on development problems, including several on rural development in China.*

FOR years the international community has been pushing uphill in the battle against poverty and hunger only to find that the problem seems recurrently to get worse. In a manner reminiscent of the tse-tse fly, which has survived all manner of attacks upon it by developing genetic mutations, world hunger has resisted the assaults of various development decades. Accordingly in recent years there has been increasing debate over the theory of development as well as the orientation of international politics.

On the international level the discussion has focused upon forging a "new international economic order" and "managing interdependence." Talk of interdependence implies that it is no longer feasible or desirable for nations to pursue policies of narrow self-interest. And even though development is usually discussed in terms of ▶

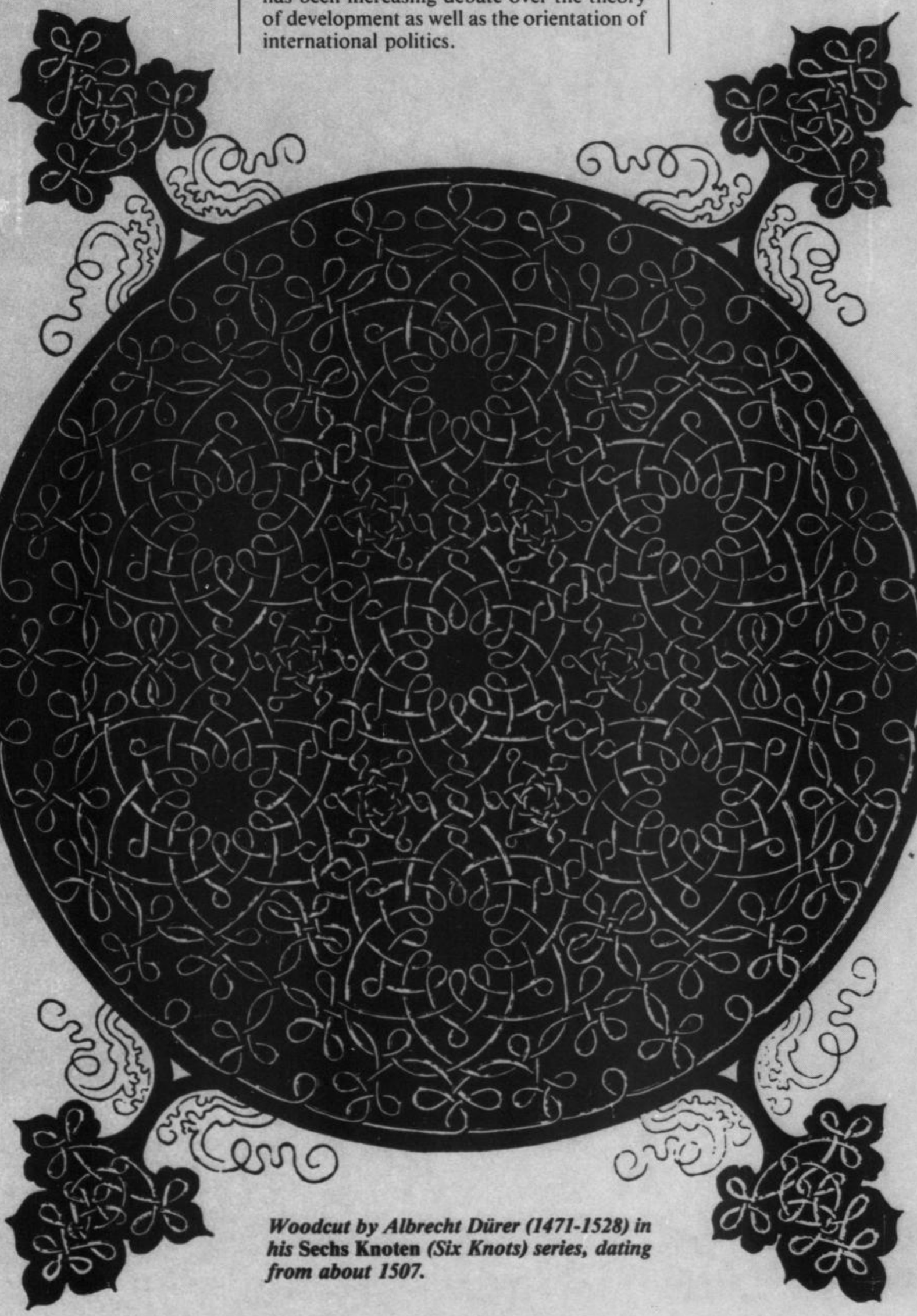


Photo © Kupferstich Kabinet, Staatliche Museen, West Berlin

Woodcut by Albrecht Dürer (1471-1528) in his* Sechs Knoten *(Six Knots) series, dating from about 1507.

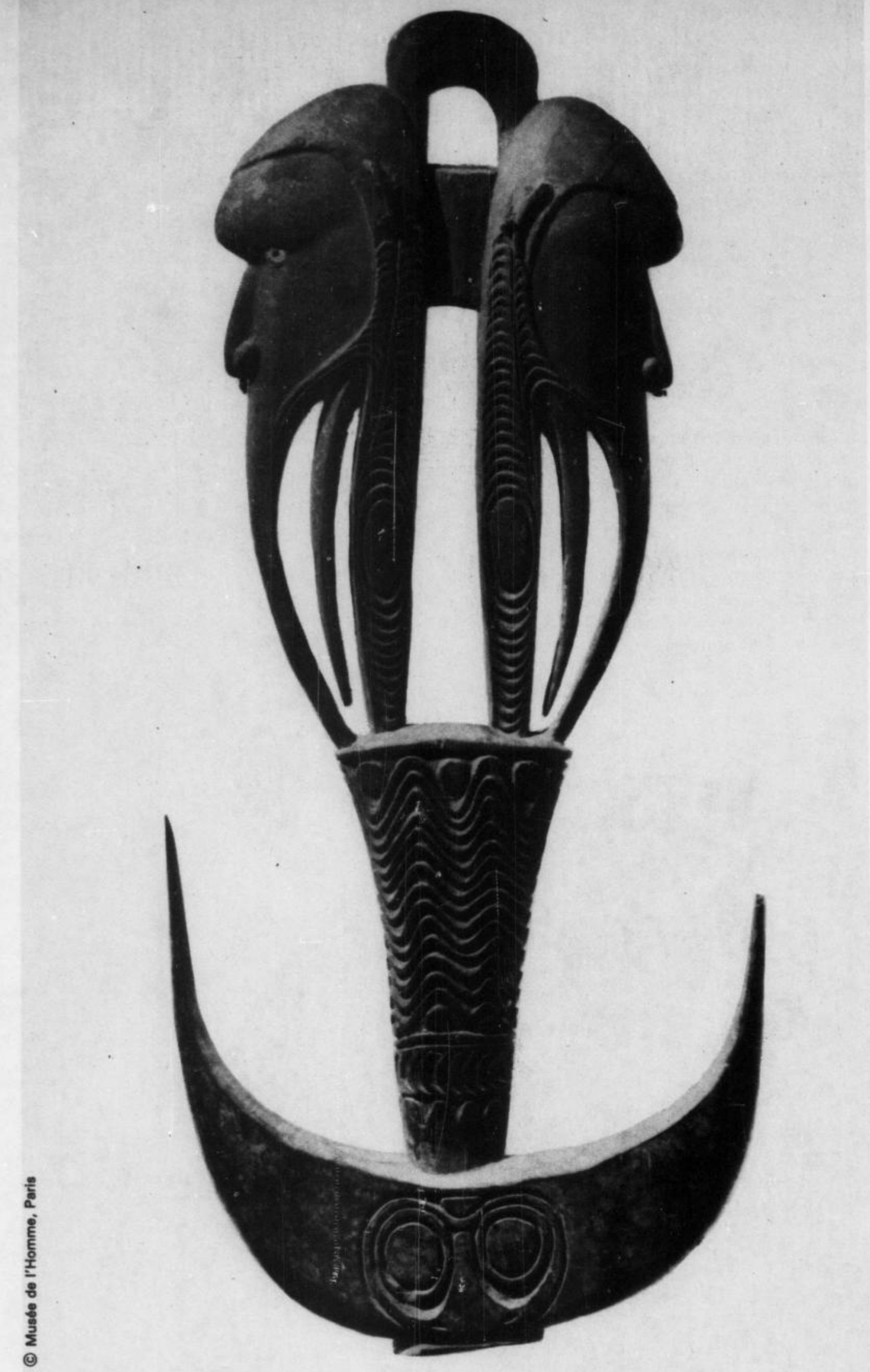


Photo © Musée de l'Homme, Paris

Above, carved wooden hook (height 74 cm) from the Sepik region of Papua New Guinea. Such hooks are fixed to the ceiling, and from them hang baskets in which food and other valuable commodities are kept out of range of children, domestic animals and pests.

Drawing of painted reliefs in the tombs of Ti and Ptah-hotep, two dignitaries of the ancient Egyptian empire. The tombs, which date from the 5th dynasty (c. 2400 BC), are at Sakkara southwest of Cairo. Reliefs show, from bottom to top: ploughing, harvesting corn, stacking, loading the crop onto donkeys, treading out the corn, harvesting papyrus reeds.

the Nation-State, what is implied is that nationalism, after all, provides too narrow a focus for overcoming poverty and hunger.

The new character of interdependence is manifested in three major ways: technological, geopolitical and cultural. Almost more than anything else this new interdependence is a function of new means of transport and communication. The ability to scan the globe for resources, production sites and market opportunities as well as to process, cross-reference and communicate this information have made the activities of businesses now more truly transnational than ever.

The geopolitics of interdependence reveals a radical transformation of the traditional economic notion of comparative advantage. Dominant States pursue their own narrow interests globally in a spirit of group egoism. The economies of developing countries are locked into, dependent upon and exploited by the developed countries. Furthermore, the developing countries are frequently viewed as political pawns in the struggle taking place between the powerful to maintain and even expand their so-called spheres of influence.

Finally there is a culture of interdependence. The material aspect is seen in the dominant forms of technology and their diffusion. The spiritual aspect is seen in the continuing battle over ideologies. This latter struggle has been so intense that voices suggesting alternatives to present forms of capitalism and socialism are barely given a serious hearing, with the result that a new culture of international solidarity is stifled.

Interdependence is a fact; and it looks like being an ever increasing aspect at all levels of contemporary life: political, economic and cultural. What is at issue is the quality of interdependence which would assure the dignity of all persons and of all peoples. To the point, it is clear that hunger is not primarily caused by population pressures, scarce resources or the lack of adequate technologies. Rather, it primarily derives from a failure of political will, which failure has roots both in individual and social abuses of power as well as an impoverished level of international culture which is bereft of a truly effective (rather than merely affective) solidarity and, thus, provides no guiding vision of development. The present quality of interdependence is troubling indeed.

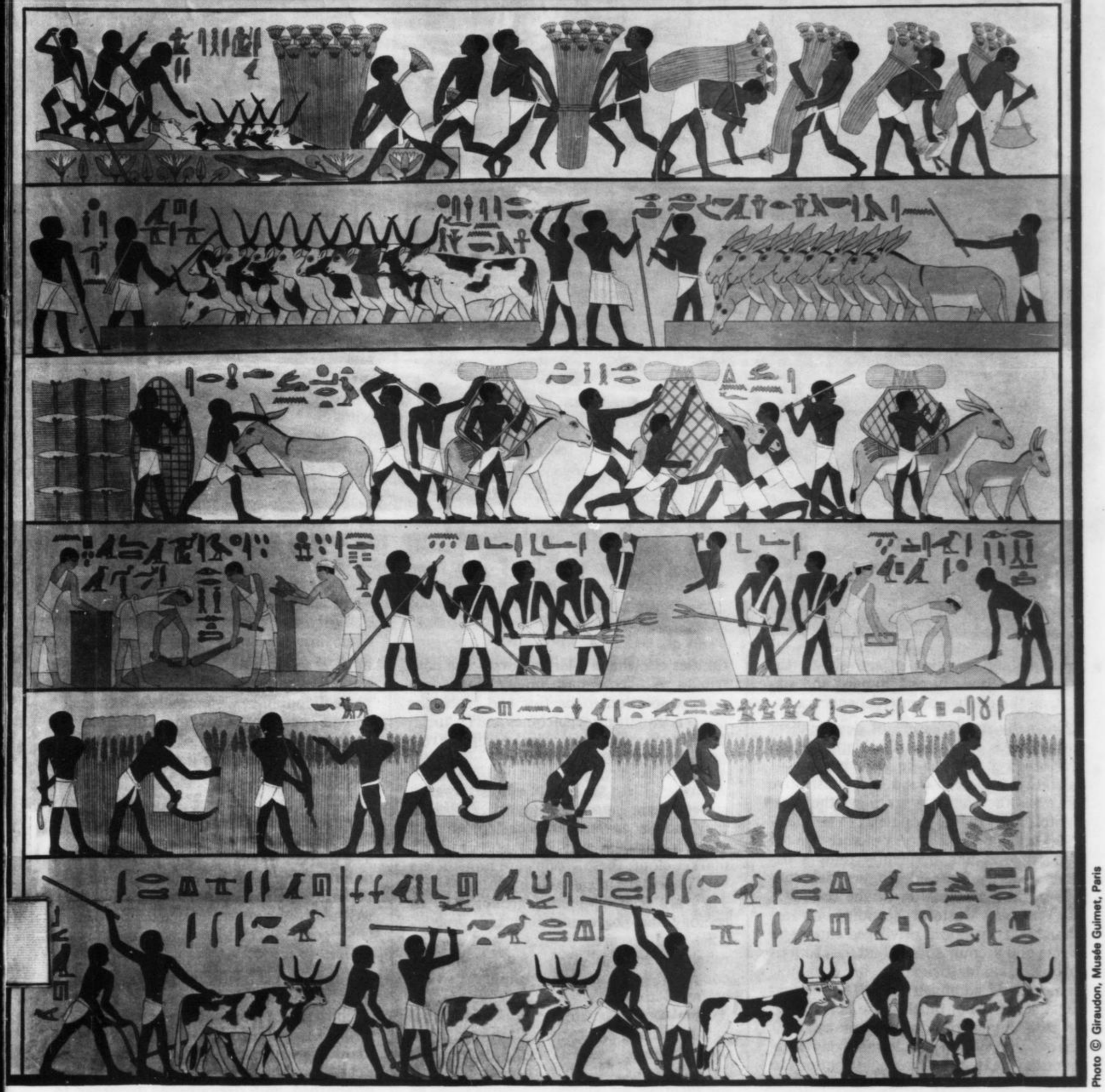


Photo © Giraudon, Musée Guimet, Paris

There are many crises in the world of international economics and development today. And, whether one considers them dysfunctions or fundamental flaws in the system, they cry out for an answer. Yet any effective answer is clearly impeded by political economic realities.

The first crisis of interdependence is the legitimacy of present political economic institutions and structures. In the Third World absolute poverty is growing, even amid economic growth. "Development" does not reach the poor, who are concentrated among the rural landless, urban unemployed, women and children. Nor will it do so without radically changed domestic priorities. At the same time the well-off countries are only just now emerging from one of the worst recessions in fifty years. Poverty itself is even growing in the industrialized world. Increasingly the developed countries are in deficit and cannot fund their own welfare programmes. Domestic concerns rather than the more glaring international needs garner the attention of politicians. These and related issues have combined to provoke a legitimacy crisis for the present international economic order. Increasingly the guiding vision of "progress" and "economic development" is being questioned and faith in social institutions is being undermined.

The second crisis afflicting contemporary interdependence is a resource crisis. This touches human resources and has to do with population numbers, rights to migration and the development of human capacities, issues which directly relate to programmes to meet basic needs and to foster human rights. It also includes non-human resources which comprise both renewable and non-renewable categories. Discussion today focuses upon energy, improvement of natural resources, and, above all, access to capital, management and technology which are very scarce in developing countries.

Finally contemporary interdependence is involved in a crisis in management and organization, at both domestic and international levels. This includes planning and administrative skills, but much more it has to do with organizational politics of bureaucracies, corruption, and with intergovernmental pacts touching terms of trade, transfers of credit, and so forth. The question is whether the large complex organizations and institutions that dominate public life today are capable of ▶

Photo All Rights Reserved

"The main obstacle to a truly effective policy to overcome hunger is lack of political will. There is a long way to go before effective solidarity is forged". Left, ceremonial seat of the Bamileke people (United Republic of Cameroon).

▶ assessing and reacting effectively to the problem of poverty and hunger and improving the quality of interdependence.

Normally in discussion of development the emphasis falls upon the Nation-State. This is as it should be for through its legislative, judicial and administrative functions the Nation-State plays the most pivotal role in development. Yet many States today present a sorry picture. On the national level one frequently finds a national security State ideology which suppresses the participation of the country's own people, wasteful spending on armaments, corruption, privileged élites who are beyond accountability, and tremendous bureaucratic inefficiencies in economic planning and administration. The international scene is not much more heartening. Developed countries doggedly pursue their narrow self-interest by destabilizing local governments, withholding contributions to international funds, tying technology to geopolitical concessions and so forth. There is no effective and fair international law.

In the face of the lack of meaningful international political controls and the domestic lack of a stable, efficient and honest set of legal institutions, market forces such as the transnationals can have a field day in the developing countries. Theoretically, however, the activities of a transnational can be harmonized with national development plans. The key depends on good, honest and effective government in the developing countries. Yet it must be recognized that both local élites as well as international interests frequently sabotage such good governments. However, even if things could be set in order, it must be realized that there can be no market solution to poverty and hunger that is not based upon profits. And not just any profits, but a level of profit commensurate with opportunities elsewhere. Market forces can contribute to overcoming hunger. But for a market solution to be fair and reach the poor, adequate price, incomes and financial policies must be put in place. Again the role of the government is pivotal.

Finally, there are groups whose power in society turns upon persuasion. Although they lack a government's instruments of social control as well as a corporation's market clout, these groups are nonetheless very important in galvanizing political will. They are seen in interest groups such as ecology and peace movements, in universities and research institutes and also in religious groups. The focus frequently enough falls upon social prophecy, which attempts to challenge and refashion the cultural value system, the dominant social paradigms and ideologies and the prevalent social interpretations of reality. It does this by stimulating awareness through publicizing information, symbolic actions (such as fasting), and through mobilization towards consciousness-raising events and programmes.

Each protagonist represents a certain potential as well as certain deficiencies when we think of their role regarding hunger in the world today. The dynamics of organizational politics frequently becomes quite complex and various forms of sanctions come into play. It is precisely in such a complex milieu of organizational politics that new policies of solidarity and interdependence which would be effective in overcoming hunger must be forged.

Some short-term measures are necessary over the next six to ten years while long term measures are being implemented. First the earnings of poor countries. Both the relative size of earnings as well as stability are important if development planning is to have a solid basis. Various formulae are possible but agreements such as the European Economic Community's "Stabex" should be expanded and improved to counteract the vagaries of present markets and secure those ends.

Second, borrowing. Private lending is always on market terms. At present, of the money going to developing countries, some 75 per cent goes to but fifteen countries. The market finds the really poor countries uninteresting. Public credit funds need to be vastly increased by donations from the well-off countries (the famed 0.7 per cent of GNP goal) and concessional terms are called for.

Thirdly, aid without political strings must be increased. Aid may take the form of commodities, outright financial grants as well as the renegotiating of the terms of loans and the outright cancellation of debts. In addition crisis facilities need to be established and strengthened in order to deal with special periodic problems related to exchange rates, food, energy and so forth.

Lastly, accords should be drafted to coordinate the activities of transnational corporations with local development plans in terms of licences, joint ventures and wholly owned subsidiaries. What is needed is a fair system of social accountability for private business decisions which, after all, have profound public effects.

All of the above measures are important but the more telling issues are found in long-term policy measures. There are many possibilities but I restrict myself to three general considerations.

First, local and international priorities in development must be refashioned. Some of the more important issues are educating people for development so that they

become active participants, cutting back the waste of military expenditures, and granting a priority in budgets and capital investments to meeting needs over wants in expenditures.

Secondly, restructuring of the economy. I think that three issues must be addressed. First, resource control. Unless resource control (access to land, credit, etc.) is faced up to no amount of "development" will reach the poor. Rather the élites of the periphery will continue to pursue their own interests *vis-à-vis* the centre. Secondly, the institutional framework must be transformed. This means that education should be reworked in order to produce adequate technology (which would also limit the brain drain). In addition efforts must be made to adapt to rather than suppress traditional forms of organization and management (such as are found in customary procedures in decision-making, informal credit, marketing and so forth). Finally, present patterns of input-output must be overhauled. Production should be in view of a market. The greatest market potential is domestic and regional rather than in the first world where markets, (for example, for textiles), are often glutted. The development of a domestic market means harmonizing agriculture and industry and setting in place an incomes policy that lets the poor make money. This means that strategies to produce growth must also produce jobs; that is appropriate (intermediate, labour intensive) technology must be used. What is produced must be decided in terms of markets (including incomes policy) as well as comparative advantages in production.

Thirdly, diversification is necessary to reduce risks. It is important to diversify what is produced so as not to be dependent upon one or two commodities or industrial products. Also trading partners must be diversified so that markets do not collapse when a recession hits one country, or consumption patterns change, or the country turns to either domestic production or to synthetics. Finally, it is important to diversify through regional (South-South) cooperation. In many places the single Nation-State is not necessarily economically viable nor can it realistically be assumed that the industrialized countries will meet all the demands of the poor in the Third World.

The main obstacle to a truly effective policy to overcome hunger is lack of political will. There is a long way to go before effective solidarity is forged. Yet the picture is not altogether bleak for increasing numbers of people (albeit with quite different motivational principles) are coming to see the necessity of such actions as those outlined above.

■ **Paul Steidl-Meier**

UNESCO
and nutrition education

by Susan Van Der Vynckt

'MALNUTRITION occurs when, over an extended period of time, the food consumed by an individual does not provide energy and/or nutrients in the amounts needed by the body. Under conditions prevailing in most developing countries, malnutrition may be more accurately described as undernutrition, since it reflects an insufficient intake of food, often combined with infections and parasitic diseases that lower the capacity of the body to utilize the energy and nutrients of whatever little food is consumed... There are also situations in which the food intake may be sufficient, even if marginally, to meet the individual's energy requirements, but is lacking in one key nutrient. This results in specific nutritional diseases, the most common of which are iron-deficiency anaemia, vitamin A-deficiency xerophthalmia and iodine-deficiency goitre."

The cold technicality of this excerpt from a recent document issued by the Food and Agriculture Organization of the United Nations (FAO) (it goes on to state that about a quarter of the children in those developing countries for which data are available suffer from moderate to severe malnutrition) does nothing to lessen the horror of the fact that malnutrition has become perhaps the major public health problem facing the developing world.

Poor and inadequate nutrition and related illnesses interfere substantially with learning ability, educational performance and the capacity to work. Malnutrition is thus both a symptom of underdevelopment and a major obstacle to the successful pursuit of national advance.

Although poverty is undoubtedly the principal cause of malnutrition, ignorance, taboos and poor nutrition practices are important contributory factors. Nutrition ▶

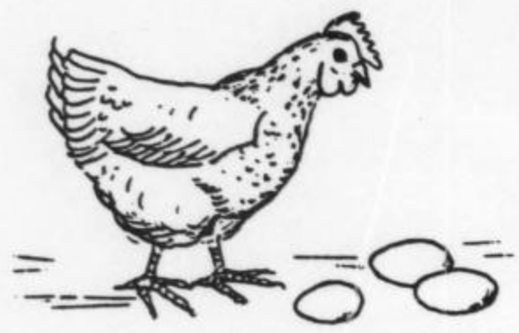
SUSAN VAN DER VYNCKT *is a specialist in nutrition, health and home economics education in Unesco's science education section. She is currently preparing a nutrition education sourcebook for teachers in primary and secondary schools in developing countries to be published by Unesco in 1985.*

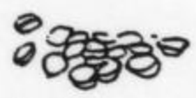
This game of Snakes and Ladders has been adapted as an educational tool to teach Tamil children some basic facts about nutrition. Players landing on the second square from the bottom in the second column from the right learn, for example, that unhygienic habits will send them sliding down the snake to a sick-bed (bottom line, second column from the left). Adding fruit and vegetables to their daily diet (third line from the bottom, left hand column) will find them climbing the ladder that leads to proper growth and a healthy life (left hand column, second line from the top).

Photo © Avanashilingam Home Science College, National Council of Educational Research and Training, New Delhi, Unicef

Food for growth

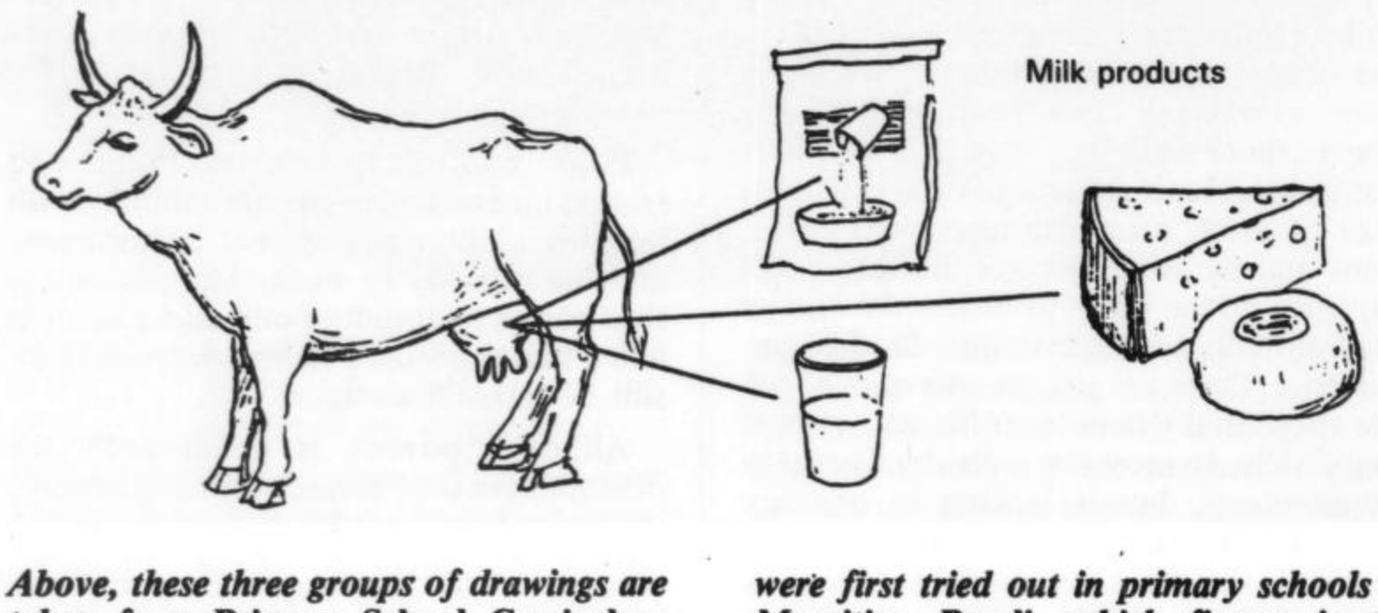
Proteins





Lentils

Bomli
(dried fish)



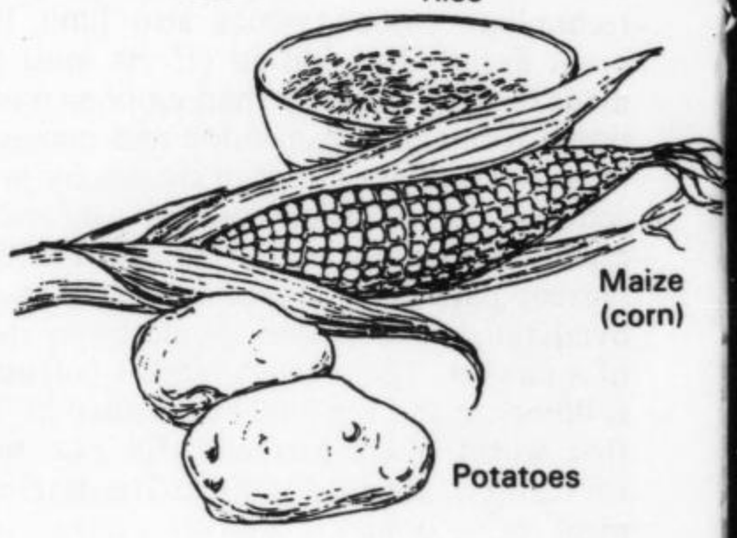
Milk products

Food for energy

Sugar and starch

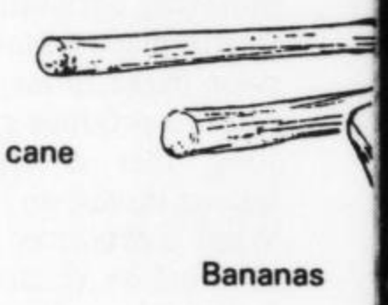
Semolina
"greau"

Rice



Maize
(corn)

Potatoes



Sugar cane

Bananas

Above, these three groups of drawings are taken from* Primary School Curriculum Planning and Selected Case Studies, *No.4 in the* Nutrition Education Series *published by Unesco to promote exchange of information and ideas about nutrition education. They form part of the Teaching Guide for lessons on "Our Body and Health" that were first tried out in primary schools in Mauritius.* Bomli, *which figures in the drawings on proteins, is a small fish which is dried and which is a popular element in the Mauritian diet. Below, Tamil schoolchildren carry shields depicting valuable dietary items. Left to right: spinach, beetroot, carrot, papaya, tomato, egg.

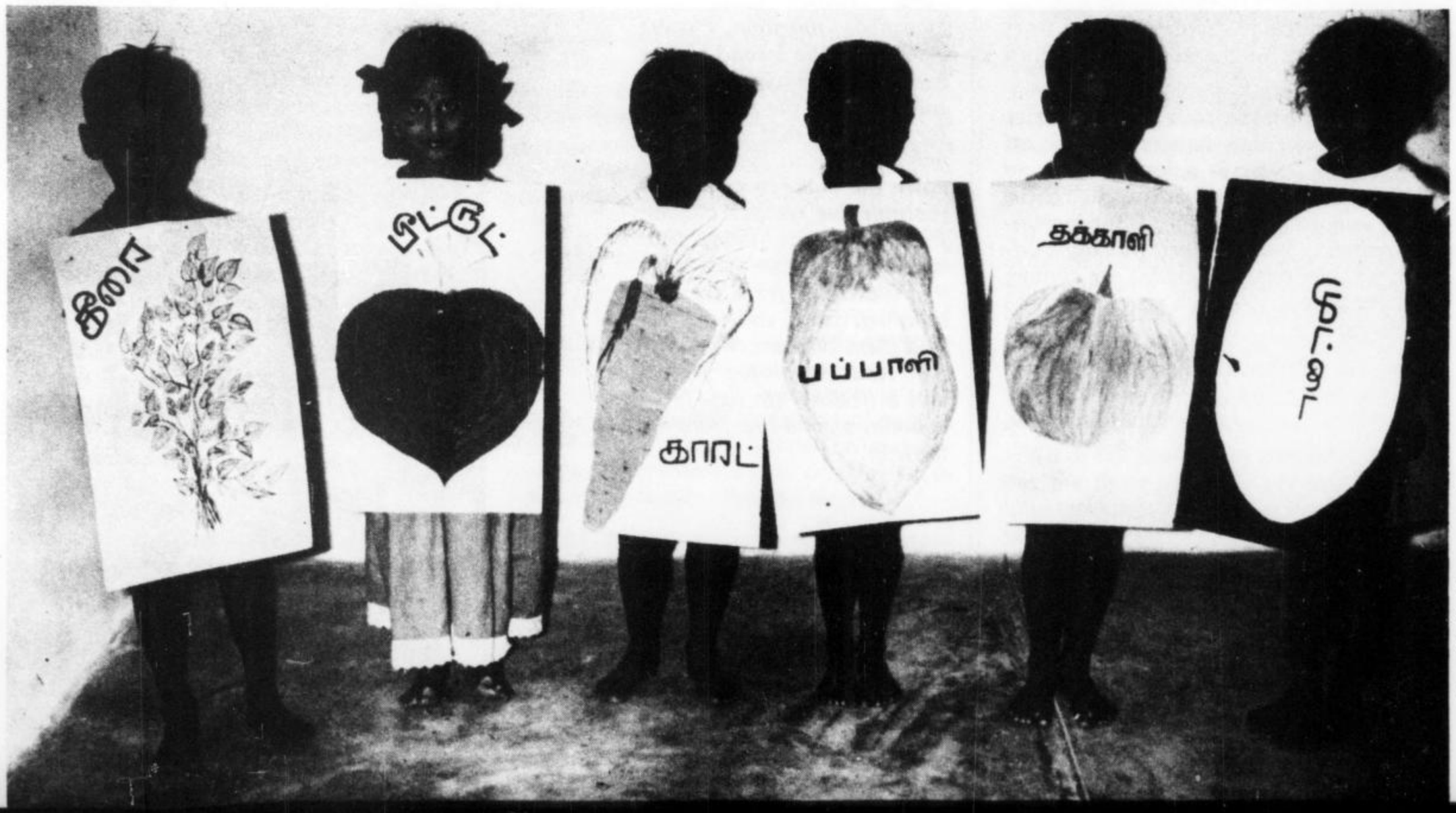
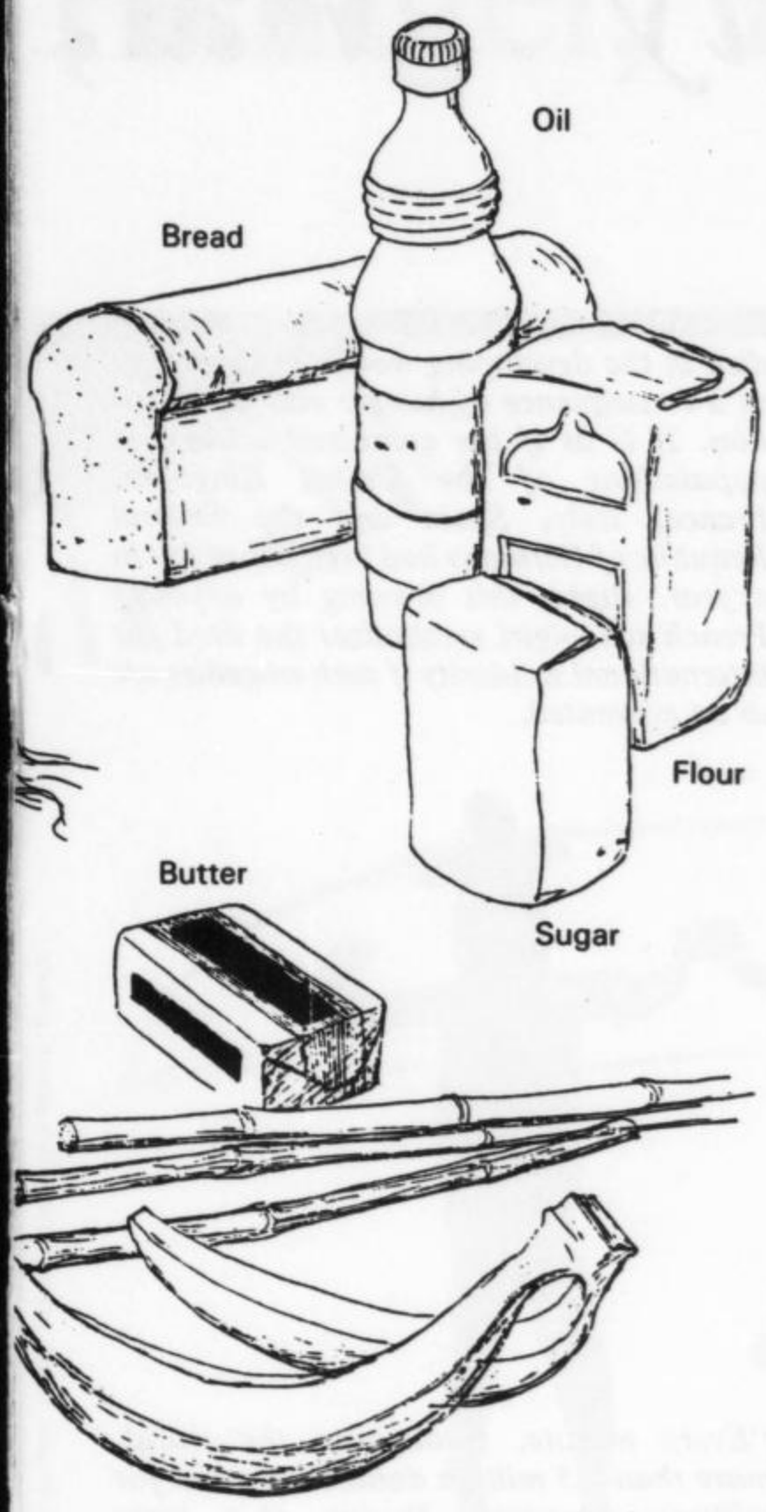
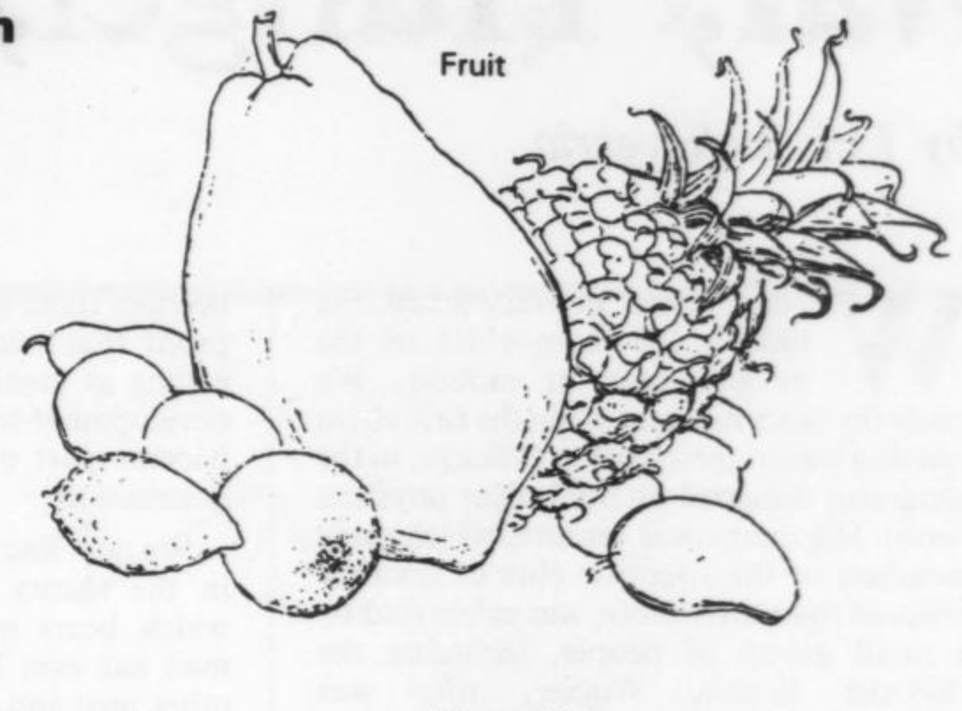


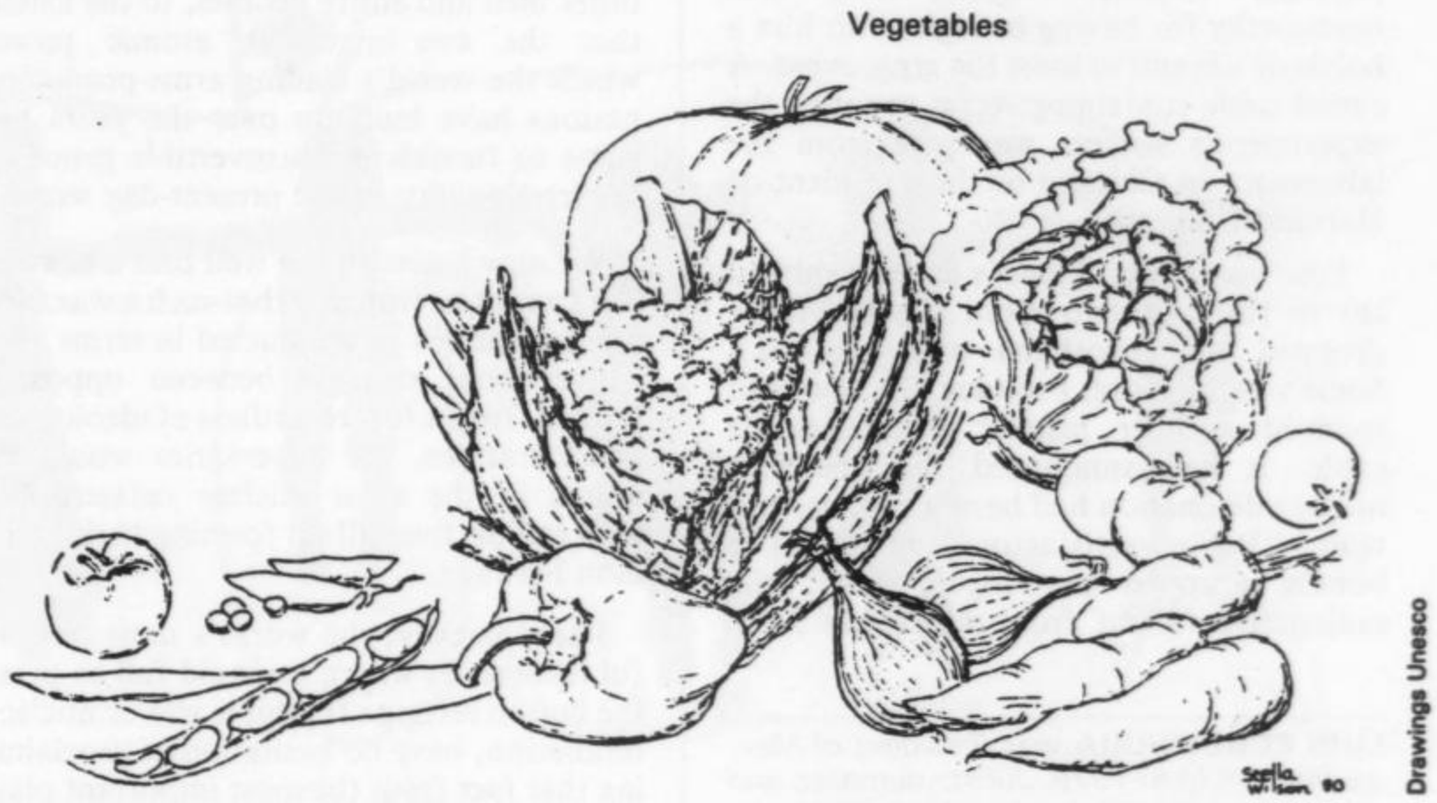
Photo © All rights reserved

Food for health

Vitamins







Drawings Unesco

▶education, if properly designed and effectively carried out, can help people, young and old, to learn about their nutritional needs and what they themselves can do the better to meet these needs. It is in this field that Unesco is making a major contribution to the fight against hunger.

All too often in the past nutrition education has been confined to the teaching in the classroom of food values and nutrient content. A much broader, far more effective approach to nutrition education is being developed which views nutrition as the study of all aspects of food and eating behaviour and includes all levels of formal and non-formal education and the mass media.

There are many channels for nutrition education and its effectiveness depends on using as many of these channels as possible. Nutrition education is, for example, being successfully incorporated into a range of non-formal education programmes including literacy, post-literacy, adult education, rural extension and community development work.

Some successful attempts are being made at incorporating nutrition teaching into literacy programmes for women. These programmes are an excellent opportunity to reach mothers with young children and can provide them with knowledge and skills that are practical, affordable and necessary to improve their own nutrition and that of their young children. Well-designed and effectively carried out, nutrition education in female literacy could bring about significant changes in the nutritional situation of millions of mothers and children in the developing world.

Over the past several years an impressive and growing base of experience has been accumulating around the world concerning the use of the media in nutrition and health promotion and the important role it can play in supporting other channels of nutrition education.

The efficacy of mass communication is indisputable in terms of its cost-effectiveness in delivering nutrition information to large numbers of people and stimulating and sustaining interest in nutrition. It is therefore important that in and out-of-school nutrition education benefit from a close partnership with the media. Communication and education personnel must work together in developing integrated media and education strategies for the promotion and maintenance of better nutrition and health.

Unesco is involved in a number of activities aimed at addressing problems of nutrition through education both in and out of school. These include:

• the preparation of a package of nutrition education materials consisting of a sourcebook for education planners and those responsible for the elaboration of curricula and the training of teachers, and other low-cost instructional support materials;

• conducting, in collaboration with the World Health Organization (WHO), workshops for media specialists and assisting in the development of national media campaigns for the promotion of good nutrition and public health practices;

• developing methods for teaching and learning about nutrition that emphasize learning by experience and problem-solving (storytelling, educational games, food demonstrations, garden projects, activities based on children teaching other children);

• developing, in collaboration with the United Nations Children's Fund (UNICEF), a series of teaching modules and materials on child health and nutrition for literacy programmes. These modules are based on the identification of local nutritional problems and the specific knowledge and skills needed to enable these problems to be handled within the household.

• publication of a nutrition education series to promote international exchange of information on teacher-training and communication activities appropriate to nutrition education. Monographs in this series are distributed free of charge throughout the world to those involved in nutrition education at all levels.

■ **Susan Van Der Vynckt**

War, Hunger, *Poverty* War,

by Luis Echeverria

WE now know, in every detail, the links in the chain which set the nuclear race in motion. We know the exact moment when the first chain reaction was triggered off in Chicago, in the apparatus designed by the Italian physicist Fermi. His theoretical venture, which some members of the scientific élite of his time believed to be unfeasible, was celebrated by a small group of people, including the physicist Eugene Wigner, who was noteworthy for having brought with him a bottle of Chianti to toast the great event. A coded cable containing secret proof of the experiment's success was sent from the laboratory in Chicago to the President of Harvard University.

Four years later, Fermi's experiment had led to the first two atom bombs—those dropped on Hiroshima and Nagasaki. Some weeks before, President Truman had received another historic and awesome cable. It had announced that the first nuclear detonation had been a success, and read: "Babies satisfactorily born". The bombs dropped in August 1945, the radioactive fallout from which has since become fixed in the human memory, were proof that science had betrayed its noble calling as mediator between mankind and development and progress, and had also become part of the "chain economy" of destruction.

We now know, in every detail, every link in the theory of nuclear extermination, which bears no comparison to anything man has ever before devised to dominate other men and entire peoples, to the extent that the ever-increasing atomic power which the world's leading arms-producing nations have built up over the years has come to furnish incontrovertible proof of the irrationality of the present-day world.

We now know all too well that a nuclear war cannot be won and that such a war cannot be planned or conducted in terms of a conventional struggle between opposing military forces for, regardless of ideological considerations, the adversaries would be united in the same nuclear catastrophe, with radioactive fallout forming their common heritage.

Paradoxically, the world's most powerful leaders, to whom it would fall to press the button setting off atomic war or nuclear retaliation, have no hesitation in proclaiming that fact from the most important platforms in their own countries and in the United Nations. Yet rearmament continues, and the build-up of nuclear warheads is assuming proportions that bear scarcely any relation to the weapons

In 1983 alone, 15 million young children died in the developing world, in large part as a consequence of hunger and malnutrition. It is as if the combined under-five populations of the United Kingdom, France, Italy, Spain and the Federal Republic of Germany had been wiped out in a year. Right, this drawing by a young French schoolgirl symbolizes the need for international solidarity if such tragedies are to be prevented.

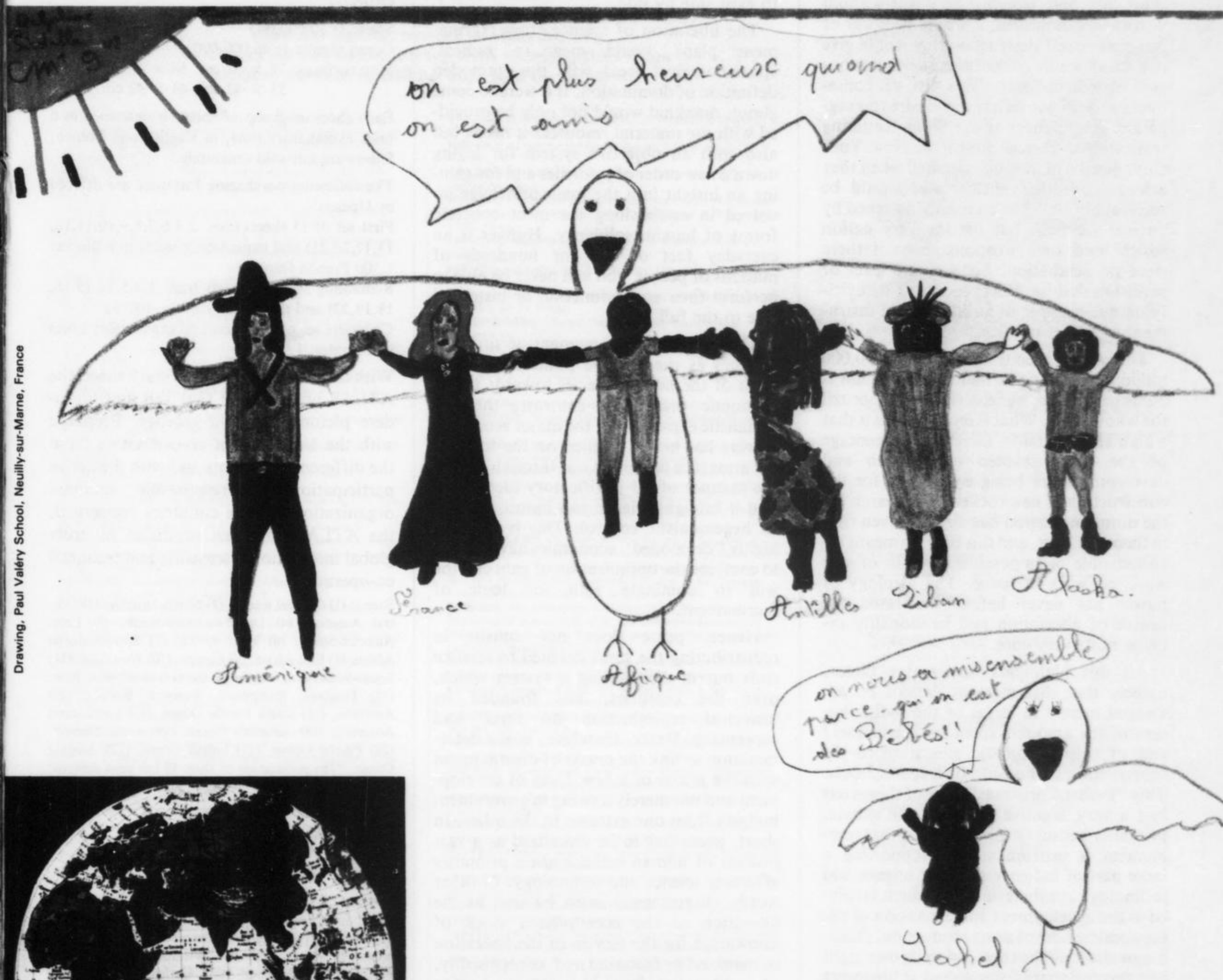
"Every minute, throughout the world, more than 1.3 million dollars are spent for military purposes. During that same minute, 30 children die in the poor countries, many of them as a result of hunger and malnutrition."
Below, Hiroshima after the atomic explosion of August 6, 1945.

LUIS ECHEVERRIA *was President of Mexico from 1970 to 1976. Jurist, journalist, and a former professor of political science at the National Autonomous University of Mexico, he is Director-General of the Centre for Third World Economic and Social Studies, Mexico City. He has also served as his country's ambassador with Unesco and in Australia.*

Photo © Comité d'Histoire de la Deuxième Guerre Mondiale, Paris

The Other Half Photomontage © Peter Kennard, London

Hunger, *Poverty* War, Hunge



Drawing, Paul Valéry School, Neuilly-sur-Marne, France

responsible for the tragic destruction of Hiroshima and Nagasaki.

Those two bombs now belong to the prehistory of nuclear extermination. The Nagasaki bomb, with its power equivalent to 20,000 tons of TNT, was a mere radioactive spark compared with present-day 10 or 15 or 50-megaton warheads. Every megaton corresponds to one million tons of conventional explosive—as measured by the traditional TNT yardstick—and the major powers have apparently stockpiled more than 50,000 such warheads. No greater or more impressive proof can be given of human blindness.

We now know, in every detail, the risks entailed, whether in tactical combat or in a more wide-ranging strategic conflict, in resorting to a pattern of terror which, once set in motion, would leave no place of refuge unspared.

All the peoples and nations of the Earth would suffer from the consequences of nuclear war in one way or another, either directly or indirectly. In view of its nature, a war of this type could not be confined to the geographical theatres projected by military planners. Unlike the bomb dropped on Hiroshima, which was the final pressure exerted on an already defeated nation, nuclear war in this day and age would represent an unbroken leap from a local conflict to a worldwide struggle by dint of the very dialectic of the arms build-up and of the widespread dissemination of strategic weapons on the high seas, on land and in the air. Nobody can predict or foresee how recourse to nuclear terror will move from the tactical phase to the strategic phase, or can prevent this from happening.

We now know, in every detail, all the scientific evidence that has been adduced in predicting the consequences of a war of this ▶

▶type. The outcome would be devastating and, at the same time, there is every likelihood of changes occurring in climate and biological structure and of an ensuing breakdown in the ecological system which, as a result of the destructive inroads being made by technology, is already becoming an urgent problem for all mankind. In short, not only would it be a war without victors or vanquished; it would be a war of progressive self-destruction that would give rise to all kinds of Kafkaesque mutations and metamorphoses. This list of consequences does not reflect any desire to exaggerate. Researchers at the Sloan-Kettering Institute for Cancer Research, New York City, put the matter in a nutshell when they acknowledge that nuclear war would be suicidal not only for an enemy attacked by nuclear weapons but for the very nation which used such weapons, even if there were no retaliation. Such is the level of precision that has been reached in demystifying nuclear war as an ideological instrument of power politics.

The world spends more than $650,000 million a year on rearmament. This sum is admittedly huge, but the figures do not tell the whole story. What is more serious is that a high and constantly increasing percentage of the sums devoted to research and development are being earmarked for the construction of new rockets. The search for the ultimate weapon has already given rise, in theory at least, and this is by no means inconceivable or impossible, to talk of star wars, of wars in space. The ideology of power has never before illustrated the degree of aberration and irrationality existing at its very core.

All this highlights one major factor, namely that disarmament cannot be envisaged merely in terms of the redistribution of the amounts spent on rearmament and of their automatic allocation to the construction of housing or infant schools. This "Father Christmas" view of things has had a very negative effect on the debate, primarily because it is well known that rearmament is instrumental in supporting a large part of industry and that science and technology are therefore very much involved in the development and expansion of the economic model of arms production. Disarmament should be regarded in its own right as a revolutionary force aimed at liberating science itself.

Disarmament and the liberation of science have the same underlying significance, above all because it is essential, at the present time, for the arms build-up—as the juridico-political expression of power politics—to be superseded by a development model that would make it impossible, as if it were historically inevitable, for hunger and the wastage of the material and scientific resources so necessary to life to exist side by side.

The liberation of science from rearmament plans would mean a radical, epistemological break with the outmoded definition of domination. If it were to come about, mankind would not only be provided with the material resources it needs but also with an objective system for laying down a new order of priorities and for gaining an insight into the main principles involved in establishing the most concrete forms of human solidarity. Hunger is an everyday fact of life for hundreds of millions of people who will never be able to perform their social function or historical role to the full.

The *praxis* of disarmament accordingly emerges as the creative political development of the human species towards a new economic order. By contrast, the imperialistic expansion of the major economic powers has hitherto relied on the logic of the arms race because it was through this, in the manner of all justificatory ideologies, that it brought science and industry under its hegemonistic control. This is why the highly "developed" economies have tended to combine the optimization of gain and the will to dominate with the logic of rearmament.

Hence, peace does not consist in redistributing the sums devoted to warlike ends but in dismantling a system which, over the centuries, has founded its historical reproduction on force and supremacy. Peace, therefore, is the determination to link the *praxis* of disarmament with the *praxis* of a new form of development and not merely a swing in government budgets from one extreme to the other. In short, peace has to be visualized as a vast process of human emancipation primarily affecting science and technology. In other words, disarmament must be seen as the liberation of the accumulated stock of knowledge for the service of the liberation of mankind by mankind and, consequently, of its liberation from its greatest common enemy: hunger and poverty.

■ **Luis Echeverria**

BOOKSHELF

Just published:

The final 9 sheets of the 22-sheet **GEOLOGICAL WORLD ATLAS,** compiled for Unesco and the Commission for the Geological Map of the World by the International Geological Mapping Office.

Scale: 1: 10,000,000
Ocean sheets: 1: 36,000,000
Map surfaces: 75 × 52 cm, 58 × 42 cm
53 × 42 cm, 44 × 42 cm

Each sheet or group of sheets is described in a brief explanatory note, in English and French. Sheets are not sold separately.

The following purchasing formulae are offered by Unesco:
First set of 13 sheets (nos. 2,3,6,7,8,9,10,11,12, 13,17,20,21) and explanatory notes in a binder: 1,300 French francs
Remaining set of 9 sheets (nos. 1,4,5,14,15,16, 18,19,22) and explanatory notes: 650 FF
Complete set of 22 sheets and explanatory notes in a binder: 1,950 FF

With the publication of the final 9 sheets the ATLAS provides the first full and up-to-date picture of world geology. Prepared with the assistance of co-ordinators from the different continents and with the active participation of responsible national organizations of the countries concerned, the ATLAS has been produced by truly global international scientific and technical co-operation.

Sheets: (1) General legend, (2) North America, (3) Central America, (4) Latin America-North, (5) Latin America-South, (6) West Africa, (7) Sub-equatorial Africa, (8) East Africa, (9) Europe, (10) West Asia, (11) South-West Asia, (12) East Asia, (13) South-East Asia, (14) Thailand, Philippines, Sumatra, Borneo, (15) Australia, (16) South Pacific Ocean, (17) Continental Antarctic, (18) Antarctic Ocean, (19) Arctic Ocean*, (20) Pacific Ocean, (21) Indian Ocean, (22) Atlantic Ocean. *The publication of sheet 19 has been delayed; it will be forwarded to purchasers during the year.

'Songs of the Pirogue'

We should like to point out to our readers that, for space and layout reasons, the artistic aspects of the pirogues (dugout canoes) of the Duala people were stressed in the article "Songs of the Pirogue" (December 1983 issue). The author, Francis M'Boulé, has asked us to make it clear that the study from which the article was inspired focuses largely on the role of the pirogue in "the exchange of goods".

The **UNESCO COURIER** is published monthly.
Individual articles and photographs not copyrighted may be reprinted providing the credit line reads "Reprinted from the **UNESCO COURIER**", plus date of issue, and three voucher copies are sent to the editor. Signed articles reprinted must bear author's name. Non-copyright photos will be supplied on request. Unsolicited manuscripts cannot be returned unless accompanied by an international reply coupon covering postage. Signed articles express the opinions of the authors and do not necessarily represent the opinions of UNESCO or those of the editors of the **UNESCO COURIER**. Photo captions and headlines are written by the Unesco Courier staff. The boundaries on maps published in the magazine do not imply official endorsement or acceptance by Unesco or the United Nations.

The Unesco Courier is produced in microform (microfilm and/or microfiche) by: (1) University Microfilms (Xerox). Ann Arbor, Michigan 48100, U.S.A.; (2) N.C.R. Microcard Edition, Indian Head, Inc., 111 West 40th Street, New York, U.S.A.; (3) Bell and Howell Co., Old Mansfield Road, Wooster, Ohio 44691, U.S.A.

Assistant Editor-in-chief: Olga Rödel
Managing Editor: Gillian Whitcomb
Editors:
English: Howard Brabyn (Paris)
French: Alain Lévêque (Paris)
Spanish: Francisco Fernandez-Santos (Paris)
Russian: Nikolai Kuznetsov (Paris)
Arabic: Sayed Osman (Paris)
German: Werner Merkli (Berne)
Japanese: Kazuo Akao (Tokyo)
Italian: Mario Guidotti (Rome)
Hindi: Krishna Gopal (Delhi)
Tamil: M. Mohammed Mustafa (Madras)
Hebrew: Alexander Broîdo (Tel Aviv)
Persian: Mohammed Reza Berenji (Teheran)
Dutch: Paul Morren (Antwerp)
Portuguese: Benedicto Silva (Rio de Janeiro)
Turkish: Mefra Ilgazer (Istambul)
Urdu: Hakim Mohammed Saïd (Karachi)
Catalan: Joan Carreras i Marti (Barcelona)
Malaysian: Azizah Hamzah (Kuala Lumpur)
Korean: Kim U-Yearn (Seoul)
Swahili: Domino Rutayebesibwa (Dar-es-Salam)
Braille: Frederick Potter (Paris)
Croato-Serb, Macedonian, Serbo-Croat, Slovene: Vitomir Sudarski (Belgrade)
Chinese: Shen Guofen (Pekin)
Bulgarian: Goran Gotev (Sofia)
Greek: Nicolas Papageorgiou (Athens)

Assistant Editors:
English Edition: Roy Malkin
French Edition:
Spanish Edition: Jorge Enrique Adoum
Research: Christiane Boucher
Illustrations: Ariane Bailey
Layout and Design: Georges Servat
Promotion: Fernando Ainsa
Special projects: Peggy Julien

All correspondence should be addressed to the Editor-in-Chief in Paris.

BRODARD GRAPHIQUE. COULOMMIERS - Dépôt légal C 1 - Avril 1984 - IMPRIMÉ EN FRANCE (Printed in France)
PHOTOCOMPOSITION-PHOTOGRAVURE CHRISTIAN PAGNOUD - 6/8 rue des Epinettes - 75017 PARIS.

Where to renew your subscription

and place your order for other Unesco publications

Order from any bookseller
or write direct to the National Distributor in your country.
(See list below; names of distributors
in countries not listed, along with subscription rates
in local currency, will be supplied on request.)

AUSTRALIA. Hunter Publications, 58A Gipps Street, Collingwood Victoria 3066; Publications: Educational Supplies Pty. Ltd. P.O. Box 33, Brookvale, 2100, NSW. Periodicals: Dominie Pty. Subscriptions Dept., P.O. Box 33, Brookvale 2100, NSW. Subagent: United Nations Association of Australia, P.O. Box 175, 5th floor, Ana House, 28 Elizabeth Street, Melbourne Victoria 3000.

AUSTRIA. Buchhandlung Gerold and Co., Graben 31, A-1011, Vienna.

BAHAMAS. Nassau Stationers Ltd., P.O. Box N-3138, Nassau.

BANGLADESH. Bangladesh Books International Ltd., Ittefaq Building, 1, R.K. Mission Rd., Hatkhola, Dacca 3. –

BARBADOS. University of the West Indies Bookshop, Cave Hill Campus, P.O. Box 64, Bridgetown.

BELGIUM. "Unesco Courier" Dutch edition only: N.V. Handelmaatschappij Keesing. Keesinglaan 2-18, 2100 Deurne-Antwerpen. French edition and general Unesco publications agent: Jean de Lannoy, 202, avenue du Roi, 1060 Brussels, CCP 000-0070823-13.

BOTSWANA. Botswana Book Centre, P.O. Box 91, Gaborone.

BURMA. Trade Corporation No. 9, 550-552 Merchant Street, Rangoon.

CANADA. Renouf Publishing Co. Ltd., 2182 St. Catherine Street West, Montreal, Que. H3H 1M7.

CHAD. Librairie Abssounout, 24 av. Charles de Gaulle, B.P. 388, N'Djamena.

CHINA. China National Publications Import and Export Corporation, P.O. Box 88, Beijing.

CYPRUS. "MAM", Archbishop Makarios 3rd Avenue, P.O. Box 1722, Nicosia.

CZECHOSLOVAKIA. – S.N.T.L., Spalena 51, Prague 1 (Permanent display); Zahranicni literatura, 11 Soukenicka, Prague 1. For Slovakia only: Alfa Verlag. – Publishers, Hurbanovo nam. 6,893 31 Bratislava – CSSR.

DENMARK. Munksgaard Export and Subscription Service, 35 Norre Sogade, DK 1370, Copenhagen K.

EGYPT (ARAB REPUBLIC OF). National Centre for Unesco Publications, No. 1 Talaat Harb Street, Cairo.

ETHIOPIA. National Agency for Unesco, P.O. Box 2996, Addis Ababa.

FINLAND. Akateeminen Kirjakauppa, Keskuskatu 1, SF-00100 Helsinki 10; Suomalainen Kirjakauppa Oy, Koivuvaarankuja 2, 01640 Vantaa 64.

FRANCE. Librairie de l'Unesco, 7, place de Fontenoy, 75700 Paris, C.C.P. 12598-48.

GABON. Librairie Hachette, B.P. 3923, Libreville.

GERMAN DEMOCRATIC REP. Buchhaus Leipzig, Postfach 140, 710 Leipzig or from Internationalen Buchhandlungen in the G.D.R.

FED. REP. OF GERMANY. For the Unesco Courier (German, English, French and Spanish editions): Mr. H. Baum, Deutscher Unesco-Kurier Vertrieb, Basaltstrasse 57, D 5300 Bonn 3. For other Unesco publications: Karger Verlag, Germering/München. For scientific maps only: Geo Center, Postfach 800830, Stuttgart 80.

GHANA. Presbyterian Bookshop Depot Ltd., P.O. Box 195, Accra; Ghana Book Suppliers Ltd., P.O. Box 7869, Accra; The University Bookshop of Ghana, Accra; The University Bookshop of Cape Coast; The University Bookshop of Legon, P.O. Box 1, Legon.

GREAT BRITAIN. See United Kingdom.

HONG KONG. Federal Publications (HK) Ltd., 5A Evergreen Industrial Mansion, 12 Yip Fat Street, Aberdeen. Swindon Book Co., 13-15, Lock Road, Kowloon. Hong Kong Government Information Services, Publication Centre, Baskerville House, 22 Ice Street.

HUNGARY. Akadémiai Könyvesbolt, Váci u. 22, Budapest V; A.K.V. Konyvtürosok Boltja, Népköztársaság utja 16, Budapest VI.

ICELAND. Snaebjörn Jonsson & Co., H.F., Hafnarstraeti 9, Reykjavik.

INDIA. Orient Longman Ltd., Kamani Marg, Ballard Estate, Bombay 400038; 17 Chittaranjan Avenue, Calcutta 13; 36a, Anna Salai, Mount Road, Madras 2; 5-9-41/1 Bashir Bagh, Hyderabad 500001 (AP); 80/1 Mahatma Gandhi Road, Bangalore-560001; 3-5-820 Hyderguda, Hyderabad-500001. Sub-Depots: Oxford Book & Stationery Co. 17 Park Street, Calcutta 70016; Scindia House, New Delhi; Publication Unit, Ministry of Education and Culture, Ex. AFO Hutments, Dr. Rajendra Prasad Road, New Delhi 110001.

INDONESIA. Bhratara Publishers and Booksellers, 29 Jl. Oto Iskandardinata III, Jakarta; Indira P.T., Jl Dr Sam Ratulangie 37, Jakarta Pusat.

IRAN. Kharazmie Publishing and Distribution Co., 28, Vessal Shirazi Street, Enghélab Avenue. P.O. Box 314/1486, Teheran; Iranian Nat. Comm. for Unesco. Seyed Jamal Eddin Assad Abadi Avenue 64th Street, Bonyad Building P.O. Box 1533, Teheran.

IRAQ. McKenzie's Bookshop, Al Rashid Street, Baghdad.

IRELAND. The Educational Company of Ireland Ltd, Ballymount Road, Walkinstown, Dublin 12; Tycooly International Publ. Ltd 6 Crofton Terrace, Dun Laoghaire Co., Dublin.

ISRAEL. A.B.C. Bookstore Ltd., P.O. Box 1283, 71 Allenby Road, Tel Aviv 61000.

ITALY. Licosa (Libreria Commissionaria Sansoni, S.p.A.) Via Lamarmora 45, Casella Postale 552, 50121 Florence.

JAMAICA. Sangster's Book Stores Ltd., P.O. Box 366, 101 Water Lane, Kingston. University of the West Indies Bookshop, Mona, Kingston.

JAPAN. Eastern Book Service Inc., 37-3 Hongo 3-chome Bunkyo-ku Tokyo 113.

KENYA. East African Publishing House, P.O. Box 30571, Nairobi.

KOREA. Korean National Commission for Unesco, P.O. Box Central 64, Seoul.

KUWAIT. The Kuwait Bookshop Co., Ltd, POB 2942, Kuwait; for the Unesco Courier; Farafalla Press Agency, P.O. Box SAFA 4541, Kuwait.

LESOTHO. Mazenod Book Centre, P.O. Mazenod. Lesotho, Southern Africa.

LIBERIA. Code and Yancy Bookshops Ltd., P.O. Box 286, Monrovia.

LIBYA. Agency for Development of Publication & Distribution, P.O. Box 34-35, Tripoli.

LUXEMBOURG. Librairie Paul Bruck, 22, Grande-Rue, Luxembourg.

MALAWI. Malawi Book Service, Head Office, P.O. Box 30044 Chichiri, Blantyre 3.

MALAYSIA. University of Malaya Cooperative Bookshop, Kuala Lumpur 22-11.

MALTA. Sapienzas, 26 Republic Street, Valletta.

MAURITIUS. Nalanda Company Ltd., 30, Bourbon Street, Port-Louis.

MONACO. British Library, 30 bd. des Moulins, Monte-Carlo.

NEPAL. Sajha Prakashan Polchowk, Kathmandu.

NETHERLANDS. For periodicals only: D&N -Faxon B.V., P.O. Box 197, 1000 AD Amsterdam; for publications only: KEESING BOEKEN B.V., Postbus 1118, 1000 BC Amsterdam.

NETHERLANDS ANTILLES. Van Dorp-Eddine N.V., P.O. Box 200, Willemstad, Curaçao. N.A.

NEW ZEALAND. Government Printing Office, Government Bookshops at: Rutland Street, P.O. Box 5344, Auckland; 130, Oxford Terrace. P.O. Box 1721 Christchurch; Alma Street, P.O. Box 857 Hamilton; Princes Street, P.O. Box 1104, Dunedin, Mulgrave Street, Private Bag, Wellington.

NIGERIA. The University Bookshop of Ife; The University Bookshop of Ibadan; P.O. 286; The University Bookshop of Nsukka; The University Bookshop of Lagos; The Ahmadu Bello University Bookshop of Zaria.

NORWAY. All publications: Johan Grundt Tanum (Booksellers), Karl Johansgate 41/43, Oslo 1; Universitets Bokhandelen, Universitetssentret, P.O.B. 307 Blindern, Oslo 3. For Unesco Courier only: A.S. Narvesens Literaturjeneste, Box 6125, Oslo 6.

PAKISTAN. Mirza Book Agency, 65 Shahrah Quaid-i-azam, P.O. Box No. 729, Lahore 3.

PHILIPPINES. The Modern Book Co., 926 Rizal Avenue, P.O. Box 632, Manila D-404.

POLAND. Orpan-Import, Palac Kultury I Nauki, Warsaw; Ars Polona-Ruch, Krakowskie Przedmiescie No. 7.00-068 WARSAW.

PORTUGAL. Dias & Andrade Ltda. Livraria Portugal, rua do Carmo 70, Lisbon.

SEYCHELLES. National Bookshop, P.O. Box 48, Mahé; New Service Ltd., Kingsgate House, P.O. Box 131, Mahé.

SIERRA LEONE. Fourah Bay, Njala University and Sierra Leone Diocesan Bookshops, Freetown.

SINGAPORE. Federal Publications (S) Pte Ltd. Times Jurong, 2 Jurong Port Road, Singapore 2261.

SOMALI DEMOCRATIC REPUBLIC. Modern Book Shop and General, P.O. Box 951, Mogadiscio.

SOUTH AFRICA. For the Unesco Courier (single copies) only: Central News agency, P.O. Box 1033, Johannesburg.

SRI LANKA. Lake House Bookshop, 100 Sir Chittampalam Gardiner Mawata P.O.B. 244 Colombo 2.

SUDAN. Al Bashir Bookshop, P.O. Box 1118, Khartoum.

SWEDEN. All publications A/B.C.E. Fritzes Kungl, Hovbokhandel, Regeringsgatan 12, Box 16356. 10327 Stockholm 16. For the Unesco Courier: Svenska FN Förbundet, Skolgrand 2, Box 150 50 S- 104 65, Stockholm.

SWITZERLAND. All publications: Europa Verlag. 5 Rämistrasse. Zurich. Librairie Payot, rue Grenus 6, 1211, Geneva 11, C.C.P. 12-236. Librairies Payot also in Lausanne, Basle, Berne, Vevey, Montreux, Neuchâtel and Zurich.

TANZANIA. Dares Salaam Bookshop, P.O.B. 9030 Dar-es-Salaam.

THAILAND. Nibondh and Co. Ltd., 40-42 Charoen Krung Road, Siyaeg Phaya Sri, P.O. Box 402; Bangkok: Suksapan Panit, Mansion 9, Rajdamnern Avenue, Bangkok; Suksit Siam Company, 1715 Rama IV Road, Bangkok.

TRINIDAD AND TOBAGO. National Commission for Unesco. 18 Alexandra Street, St. Clair, Trinidad, W.I.

TURKEY. Haset Kitapevi A.S., Istiklâl Caddesi, N° 469, Posta Kutusu 219, Beyoglu, Istambul.

UGANDA. Uganda Bookshop, P.O. Box 7145, Kampala.

UNITED KINGDOM. H.M. Stationery Office, H.M.S.O., P.O. Box 276, London, SW8 5DT, and Govt. Bookshops in London. Edinburgh, Belfast, Manchester, Birmingham, Bristol; for scientific maps only: McCarta Ltd., 122 King's Cross Road, London WC 1X 9 DS.

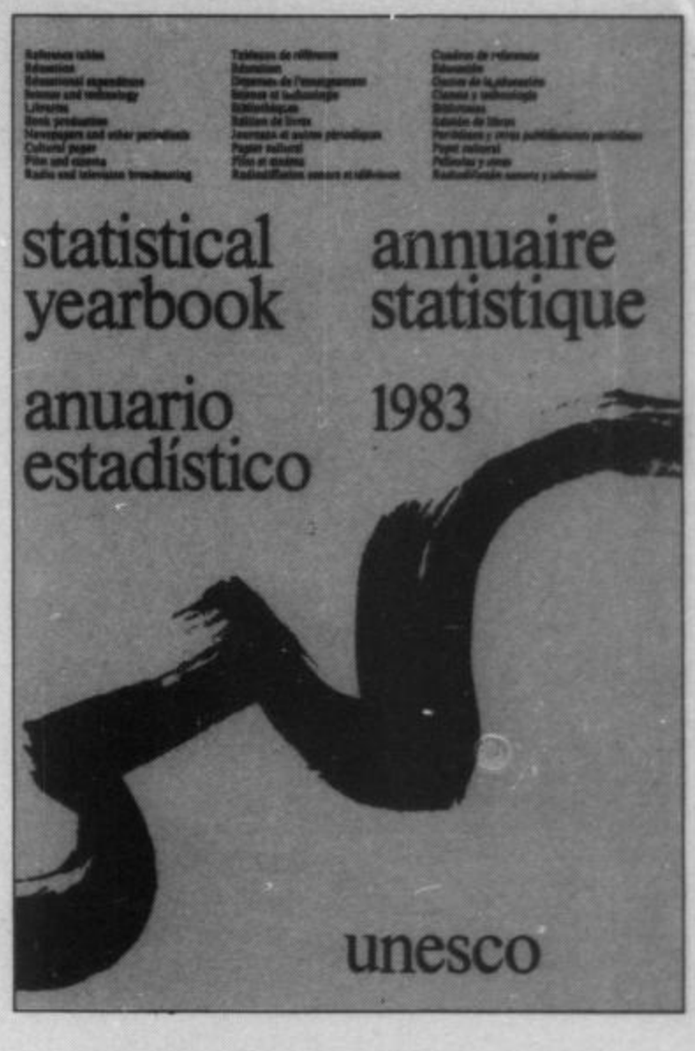
UNITED STATES. Unipub, 205 East 42nd Street, New York, N.Y. 10017. Orders for books & Periodicals: Box 433, Murray Hill Station, New York, N.Y. 10157.

U.S.S.R. Mezhdunarodnaya Kniga, Moscow, G-200.

YUGOSLAVIA. Mladost, Ilica 30/11, Zagreb; Cankarjeva Zalozba, Zopitarjeva 2, Lubljana; Nolit, Terazije 27/11, Belgrade.

ZAMBIA. National Educational Distribution Co. of Zambia Ltd., P.O. Box 2664 Lusaka.

ZIMBABWE. Textbook Sales (PVT) Ltd., 67 Union Avenue, Harare.



Just published

The latest edition of Unesco's popular reference book of statistics from some 200 countries and territories on:

Population

Education

Science and technology

Libraries

Book production

Newspapers and other periodicals

Paper consumption

Film and cinema

TV and radio

Prepared with the co-operation of National Commissions for Unesco and national statistical services, and with the help of the Statistical Office and the Population Division of the United Nations.

Trilingual
English/French/Spanish
1064 pages, 300 French francs

Also available

Statistical Digest 1983

This third edition of the *Statistical Digest* has been prepared in response to a growing demand for basic statistics covering the fields of Unesco's competence presented in an easily accessible form.

334 pages, 36 francs
Bilingual English/French

PHOTOCOMPOSITION-PHOTOGRAVURE CHRISTIAN PAGNOUD - 6/8 Rue des Epinettes - 75017 PARIS.

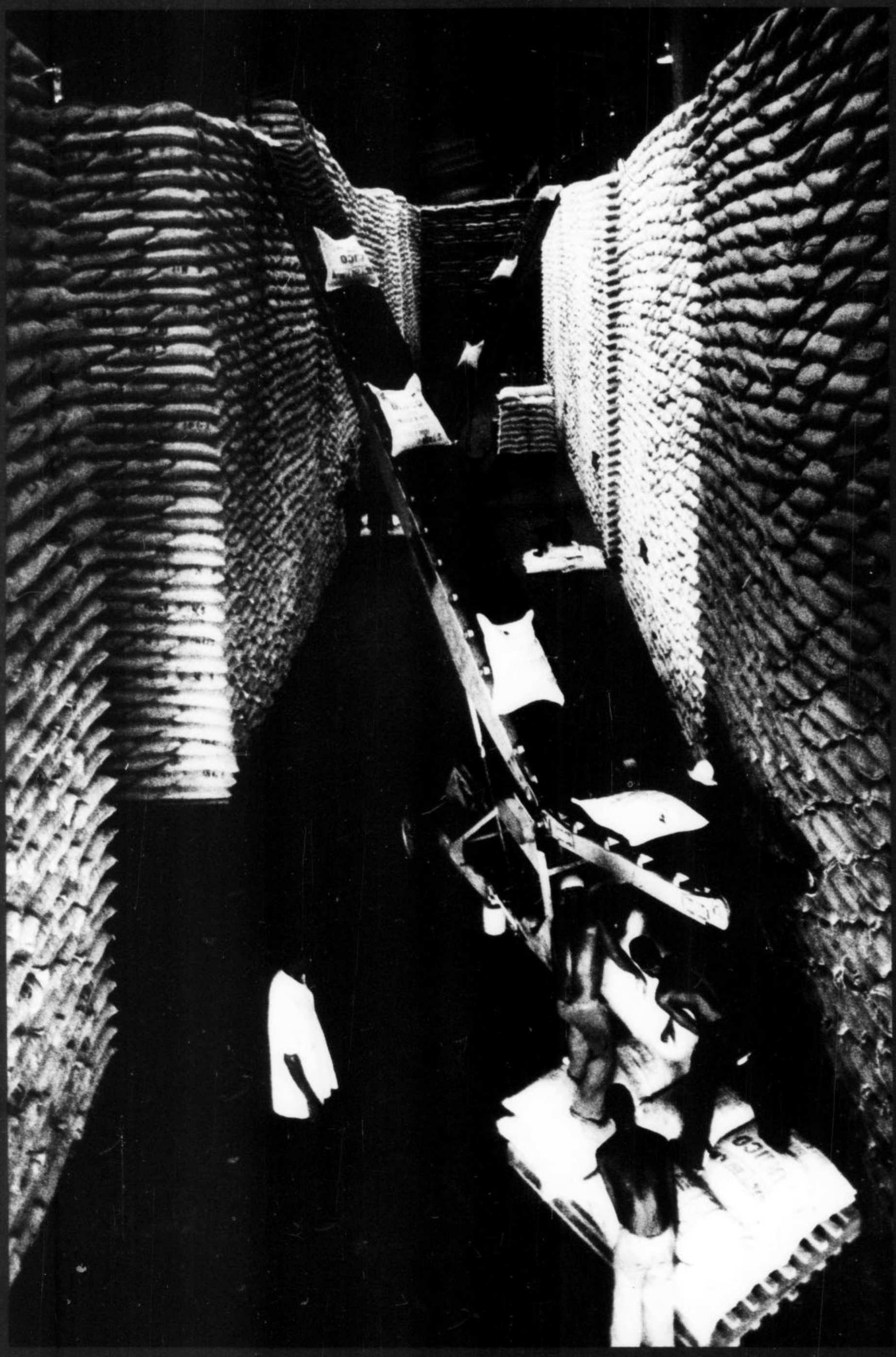


Photo M. and A. Kirtley ANA Paris

The coffee stored in this imposing warehouse at San Pedro forms a major part of the export wealth of the Ivory Coast, the third largest coffee producer in the world after Brazil and Colombia. A major problem facing many developing countries whose economies are dependent upon the export of one or two primary products is that they are largely at the mercy of fluctuations in the world markets. When the terms of trade turn against them, income from their exports may be insufficient to enable them to import foodstuffs to compensate for any short-fall in domestic food production.

Q4